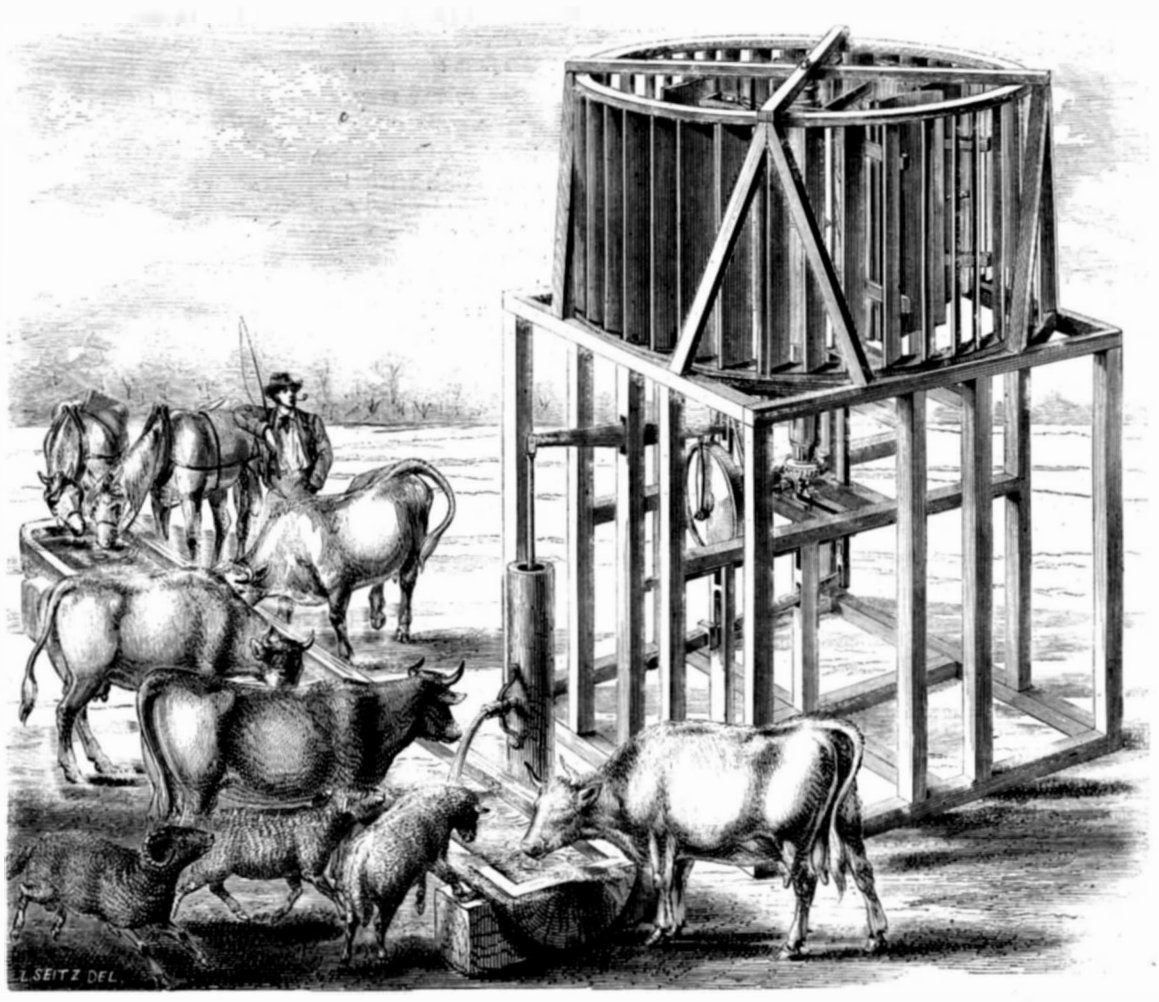
SCIENTIFIC AMERICAN

A WEEKLY JOURNAL OF PRACTICAL INFORMATION, ART, SCIENCE, MECHANICS, CHEMISTRY, AND MANUFACTURES.

Vol. XVI.---No. 6. [NEW SERIES.] NEW YORK, FEBRUARY 9, 1867. $3 per Annum. [IN ADVANCE.]

Improved Windmill.

Although the force of wind is an unreliable motor for some manufacturing purposes, yet it affords a cheap and ready means for driving machines the proper action of which does not depend upon absolute steadiness of motion. It has been and is still extensively employed in some sections of this country for pumping and other purposes. For service, at railway stations and on farms, it is a valuable aid to man. Much of this value, however, depends upon the plan and construction of the wind wheel or mill. The one represented herewith appears to be constructed on right principles and is calculated to work satisfactorily under all circumstances, whatever the force or direction of the wind. It is a horizontal wheel, mounted on a vertical shaft, and having eight fans or buckets hinged at their inner edge on uprights secured to radial arms. These fans are connected in pairs by pivoted iron rods so as to insure each one of each pair moving together when the angles of their inclination are changed. One fan of each pair has also a projecting brace, which connects by an iron rod with a bell crank lever on an upright bar near the central shaft. From this lever a rod passes down to an enveloping and sliding collar on the upright shaft, There are four of these bell cranks, one to each pair of fans, and by the raising or lowering of the sliding collar the fans are set at any required angle to suit the force of the wind. This collar is raised or lowered by a lever having a sliding weight by which its action on the collar can be regulated. This lever will also operate a lever brake in case of a gale—being self-operating under great pressure—which bears upon the rim of the fly-wheel. At the foot of the vertical shaft is a beveled gear engaging with another on a horizontal shaft, which carries a balance wheel having a crank to operate a walking beam for pumping purposes. The wind wheel is inclosed in a circular frame having upright slats set at an angle, to divert or guide the current of air upon the fans, giving a rotary motion always in one direction.



STRUNK'S WINDMILL.

The labor of raising water from wells for cattle is an onerous one. Where all the water used must be obtained from wells sometimes of great depth—one hundred and more feet, as on the prairies—the task is no small one. It has been estimated that cattle ordinarily consume fourteen gallons per head daily. Twenty head of cattle—not a large number on a farm—will therefore consume about three thousand barrels of water annually. In such cases an apparatus like that illustrated in the engraving would be invaluable, and also for railroads where the water for the locomotives is drawn from wells.

The inventor says that this machine will work equally well in a gale as in a moderate wind.

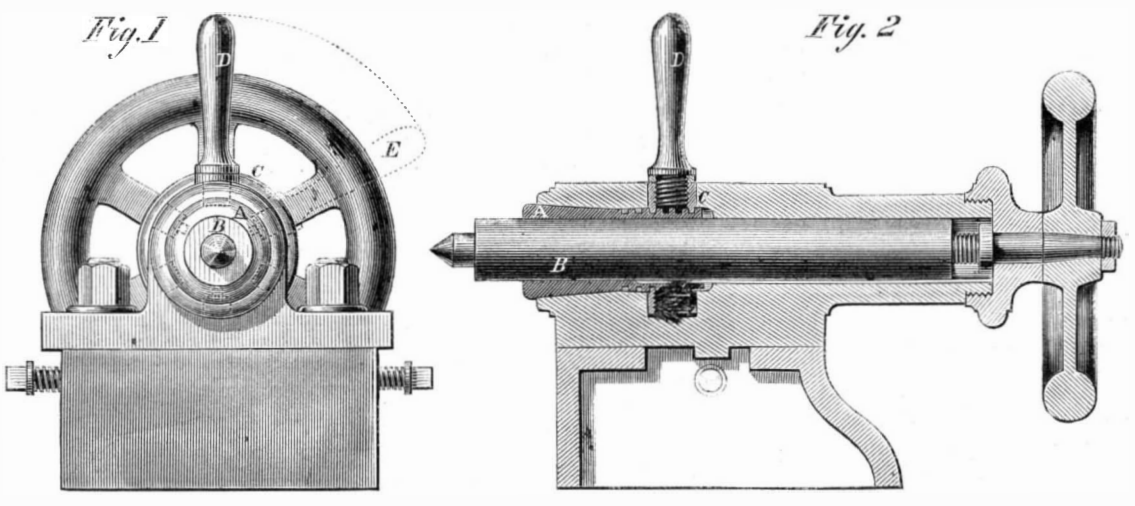
At the late State Fair of Wisconsin one of these machines pumped nearly all the water used for the stock on the grounds, from a depth of more than one hundred feet. The lower part of the structure can be boarded in and roofed, making a convenient granary, store-house, or carriage shed; or the wheel can be erected upon any building.

The device was patented through the Scientific American Patent Agency Nov. 13, 1866. For further particulars address F. & D. Strunk, Janesville, Wis.

Improved Lathe Arbor Tightener.

The most common methods of securing the dead arbor of a lathe at any point is either by a set screw bearing on its upper surface, or a ring with threaded stem set up with a lever nut. There are objections to both, especially when the tail stock is worn and the spindle becomes loose. The device herewith illustrated shows a sleeve, A, enveloping the arbor, B, and having the front end slightly cone shaped. The cylindrical part has a coarse thread cut on it and the whole sleeve fits a corresponding recess in the stock. It should be made of steel. It is slotted on the inside its whole length to receive a feather on the arbor as usual. The cone-shaped portion is cut through, to give it sufficient spring to close around the arbor when drawn back into the stock. C is a circular nut in a transverse recess which engages with the thread on the sleeve and has on its periphery tapped holes for receiving the handle, D.

By depressing this handle, as at E, Fig. 1, the sleeve is drawn back into the stock and holds the spindle with a perfect gripe, as it has a bearing around its whole circumference.



FAUGHT'S LATHE ARBOR TIGHTENER.

If at any time the spindle, sleeve, or the recess in the stock is worn by use, the handle, D, may be unscrewed and placed in another tapped hole.

The advantages of this device, so far at least as holding the arbor perfectly stiff is concerned, may be understood by any machinist. We regard it as a valuable device, as it cannot fail to keep the spindle always in line, and prevent the annoyances of finding the dead arbor out of line when set up. It is the invention of Luther R. Faught, who secured a patent through the Scientific American Patent Agency, Dec. 14, 1866, and who will reply to all inquiries in relation thereto. Address him at Sixteenth and Callowhill streets, Philadelphia, Pa.

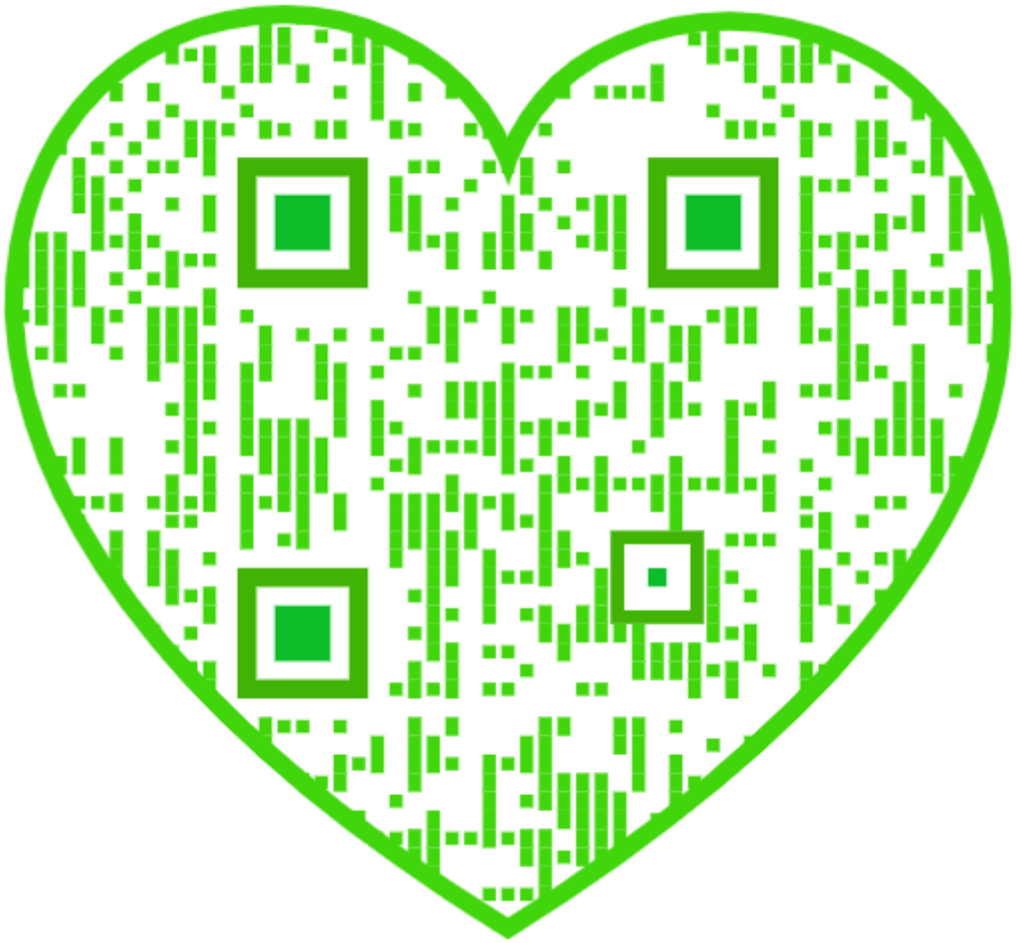
The "Miantonomoh."

The visit of the United States turret-ship *Miantonomoh* to Gibraltar called forth the following remarks in the *Chronicle* of the 15th Dec.:—"The American iron-clad turret-ship *Miantonomoh*, which arrived in this port yesterday, is the first vessel of her class that has visited Gibraltar, and is naturally the object of much curiosity. The feeling that would be uppermost in most minds on first beholding this *monstrum, informe, ingens*, of the waters would be one of surprise that she should cross the Atlantic. Two huge turrets, the funnel and the ship's boats suspended on their davits high in air, are nearly all that is seen above water. The ship herself is a great platform rising little more above the surface of the sea than her own boats. Molière's fencing master says that the whole art of fence is comprised in two things—to hit your adversary and not to get hit yourself: the *Miantonomoh* seems constructed to carry out this doctrine in naval warfare. Her hitting apparatus, the two impenetrable towers with their Dahlgren 480-pounders, of which she carries two in each turret, is the only part she presents to an enemy, while the only part that he could hit to do her an injury is wisely screened below the waves, except the narrow rim that, like the tower, is invulnerable. We have not heard what thickness of iron is beneath the platform deck that supports the fighting part of the ship; but, unless the deck is made as invulnerable to heavy shot as are the sides and turrets, a vertical fire would still find a weak point in these formidable ships. If ever Gibraltar should be attacked again by floating batteries, they will be of harder and less inflammable material than those employed in the celebrated siege. General Elliott's red-hot shot, instead of setting fire to the floating batteries of the present day, would fly off from their sides in a thousand glowing fragments, like the sparks from heated iron beneath the blacksmith's hammer. If, then, heated shot are useless, and cold shot cannot penetrate the sides of modern iron-clads, it would be a satisfaction, in case of attack, if our artillery could penetrate them in another way, by plunging shot upon their deck from the level of the signal house or the rock gun. To send shot through an attacking ship from top to bottom would be much more damaging to her than sending it through from side to side. After all, however, we cannot feel quite sure that our ability to launch a vertical fire against an attacking squadron will ever prove of practical advantage, There is just now the keenest competition between the science of attack and that of defence. Who knows whether an enemy attacking Gibraltar from the sea on some future day may not have provided his vessels with impenetrable iron roofs, beneath which he may hammer away at our walls quite regardless of the shot that is pattering overhead like hail upon the slates."

150 FEET is understood to be about the maximum depth of the Straits of Dover. At this depth a leak in the proposed tunnel of only one square foot in area would require a steam engine of 1,600 horse-powor to overcome it, while the pressure on every square foot of the bed, and, of course, if the bed were soft and capable of transmitting the pressure, on each square foot of tunnel, would exeeed four tuns.

AT the Oaks colliery, England, where so many perished, the workings reach to a distance of two miles, and the air-ways are sixty miles in length.

© 1867 SCIENTIFIC AMERICAN, INC.



SILVER MINING IN THE GREAT BASIN.

We have been favored, through the politeness of the author, with a copy of a paper read by Richard Williams, Esq., before the Buffalo Historical Society, on the Great Basin, with its Agricultural and Mineral Wealth. These personal observations of an experienced and practical eye, are interesting and instructive on whatever they touch. We reproduce a few leading points in a condensed abstract.

STRUCTURE OF THE BASIN.

The great chain of the Andes, extending the whole length of South America and the Isthmus of Darien, branches at the Isthmus of Tehuantepec, sending one of its arms up on the western side, very near the Pacific coast, under the name of the Sierra Nevada, in California, and the other to the eastward, under the name of the Rocky Mountains. These branches diverge to a distance of nearly 800 miles apart, and come nearly together again where they are lost in the Arctic Ocean. Thus they form an intramontane Basin of vast extent, nearly one-fifth of the whole continent, 5,500 feet above the sea, and having only three fluvial outlets—that of the Rio Grande on the south-east, that of the Colorado on the South-west, and that of the Columbia on the north-west. This basin is broken up by transverse ranges, like bulkheads or girders from rim to rim, forming inferior basins, two of which—that of the city of Mexico, and that of Great Salt Lake—have no visible outlets whatever. The latter is the great mineral basin, 400 miles square, mainly occupied by the State of Nevada, where the chief interest of these remarks centers. Here the rivers find their outlets in "sinks," and go down into the unexplored bowels of the earth. The lakes are "salt," and the flats are impregnated with alkali, which Mr. Williams attributes to the settling of the rivers, leaving their suspended soluble contents filtered out in the earth or deposited by evaporation. The soil is not silicious—a sandy desert—but contains within it every element of fertility except water, and produces abundantly wherever irrigated by nature or art.

THE GOLD AND SILVER MINES.

In this basin, above all, occur those districts in which, throughout a square of ten to twenty miles, the rocky crust of the earth has been cracked in numerous fissures of unmeasured depth which the underlying volcanic ocean has injected and gorged with mineral treasure. These fissures are either entire, extending great lengths and to impracticable depths, and filled with silver-ore-bearing quartz; or they are but gashes in the surface, broken up by past convulsions which destroyed their continuity, and they cannot be followed to any considerable length or depth, or with continued profit. Appearances are very deceptive, being sometimes extremely flattering at an outcropping point, while the rest of the vein is barren. A true vein is not always rich; a rich vein is not always true, *i. e.* continuous. A fissure, both rich and true, is not always practically valuable for mining at the present day, from its remoteness or other difficulty of access, from the want of water, fuel, salt, or other supplies, from the neighborhood of hostile Indians, or the distance of any civilized community or from being covered with snow for two-thirds of the year. Difficulties from conflicting claims, crossing one another, sometimes occur. All these things, and more, have to be considered, and there is, in fact, but one way of getting at the certainty of any vein, and that is by personal examination of all the circumstances, and, regardless of representations from interested parties, mining engineers, or even eminent geologists, actually going down on the lead far enough to ascertain its true character, and by large assays determining the general productiveness of the ore. So great is the uncertainty attending these ventures at the best, that Mr. Williams thinks it the true policy for all who engage in silver mining to take up a sufficient number of lodes together to be morally certain by the average of chances that some one or other will pay.

SWINDLING OPERATIONS.

Everything, good, bad or indifferent, is recorded among the mining claims of a district, and upward of 4,500 such recorded locations are referred to by Mr. Williams in a single district where not a dozen of them at present would pay the expense of working. All the good claims are sold readily in the state: the rest are sent east and jobbed off by mining agents and organizers of mining companies of mammoth nominal capital. Mr. Williams lays it down as a rule, that no one can make a purchase of these unscrupulous speculators in mining property without being swindled every time. This can be done, according to the common ethics of trade, in a perfectly fair manner. No man is held bound to reveal the disadvantages of his property: if he states only the truth, he sells "fairly," when the whole truth (which the buyer does not usually undertake the difficult task of ascertaining) if told, would be fatal to the bargain. Scientific opinions, however honest and eminent, as to what is to be found in the bowels of the earth under a particular spot, are treated as of no value: and just as little worth is attributed to the advice of the so-called "experienced men." They never agree as to a uniform law, and their deductions are from a narrow and unscientific range of observation. Above all, our lecturer is severe upon a class of self-styled mining engineers, professors, etc., who infest the country, whose names are found in every yellow-covered prospectus, and whose favorable opinions can always be had for a consideration. Of all the mammoth millionaire prospectuses he has seen, not one but was filled with the grossest misrepresentations. Beware of all such enterprises as are associated with the names of distinguished military and scientific men, governors, politicians, bishops and doctors of divinity. These names are generally connected with a present of stock, which the recipient perhaps may value highly. But "good wine needs no bush." The few, very few really valuable mines are owned by quiet unpretending men, and carried on, financially and practically, without public proclamation and parade. You never see their prospectuses and their stock in the market, are bored with the one, or importuned to buy the other.

[Our Foreign Correspondence.]

WATER SUPPLY OF TOWNS.

London, Dec. 29, 1866.

A variety of causes render the obtaining a good supply of water for the large cities here a more difficult problem than with us. Although the amount of annual rainfall is large, yet, as the drainage area is in no case large, the rivers are all small, and the water is made use of for manufacturing purposes. Then again, as the population is everywhere dense, the watercourses are all unavoidably contaminated with sewage, and though by acts of parliament towns and villages situated on rivers from which water is taken for city use have been prohibited from discharging their sewage into the streams, yet the impurities that will in any case, even with the strictest regulations, find their way into rivers flowing through such a country as that in which the Thames, for instance, lies, make it impossible to obtain potable water from such a source.

THE ISLAND TOO SMALL—WATER SUPPLY LIMITED.

As these rivers also are mere brooks, and the cities large and numerous, and as the water is claimed by the many manufacturing establishments situated on their banks, it follows that the amount which the water companies are able to supply to the towns is very inadequate for all the purposes to which it would be applied were the supply more abundant. This is strikingly shown in the relative amounts consumed daily per head of population in London and New York, being at the rate of about 33 gallons per head in the former city against 60 gallons in the latter. No doubt in New York, where the supply is so copious, a large proportion is wasted, but it is a luxury to feel that it may be wasted to some extent with impunity. To guard against waste, the water is not kept at constant service in the mains, but a certain quantity is supplied each day to the houses by "turncocks," who allow the water to run for a few minutes from the main into the service pipes of the dwellings, the water being received into tanks, and the supply is then shut off for the day. Although these tanks may contain enough for a day's use, it is evident that the knowledge that the amount is limited will enforce economy in its use. But as stated in my last, this is a serious inconvenience in case of fire, as it is often necessary to hunt up the turncock at a time when every moment is precious. On Sundays some companies do not supply water to their customers.

EXCEPTIONS—MANCHESTER AND GLASGOW.

There are some cities, however, which are more highly favored in their water supply and present a pleasing contrast to London and the majority of the large cities. Such are Manchester and Glasgow, in the latter of which especially the water is excellent in quality and very abundant. The works for the supply of this city are, I think, the most extended of any in Great Britain. The water is drawn from Loch Katrine, and those who have visited that charming lake as tourists will not have failed to be struck with the remarkable clearness of the water, objects being plainly visible on the bottom at a great depth. It is conducted a distance of forty miles to the city through two cast-iron mains.

NEW SCHEMES FOR LONDON.

There are at present several plans being brought forward with considerable earnestness for procuring a better supply for London, and no doubt some of them will eventually be adopted. One plan is to build an aqueduct more than two hundred miles in length, or rather a succession of aqueducts connecting together some of the lakes of Westmoreland (or as we commonly call them in America, "the English lakes") and conducting the surplus water to the metropolis. Another seeks an adequate supply in Wales: but while there will be great discussion in Parliament as to what plan shall be finally decided upon, there is no difference of opinion that some other source must be found than those now depended upon.

PRESENT LONDON SYSTEM—FILTRATION.

At present London is supplied with water by eight private companies, each supplying a certain district and drawing their water from the Thames and the sea. In all cases it is necessary to employ pumping engines, as there is no natural head, and many of the companies pump their water twice over. The drainage area of the Thames above Staines is 3,086 square miles, and its mean annual discharge is 900,000,000 per day. Five of the companies take their water from the Thames, and are authorized to withdraw altogether 100,000,000 gallons per day, the minimum flow of the river being estimated at 362,000,000 gallons per day. In most cases the water is taken from the river directly into subsiding reservoirs constructed directly on the river side, but in some works it goes immediately to the filter beds. The necessity for the use of these is quite imperative, as was clearly shown last summer, when some of the severest ravages of the cholera followed the delivery by one of the companies of unfiltrated water to its consumers.

They consist of a series of layers of gravel and sand of about five or six feet thickness in all, the arrangement being about as follows:—First, coarse gravel about twelve inches in depth is laid on the concrete bottom of the bed, and upon this nine inches of rough screened gravel, followed by nine inches of fine gravel, or in some cases six inches of cockle and other shells: upon this again is a layer of coarse sand twelve inches thick, and lastly fine sand two or three feet thick on top of all. The water is admitted by a main passing through the bed and having a vertical branch rising above the filtering material, the water welling over the top of this delivery pipe upon the filter. In the coarse gravel at the bottom are imbedded perforated pipes laid with open joints arranged as lateral branches of a central main, and these receive the water as it percolates through the gravel, and deliver it to the pump wells. The amount of impurity removed from the water by these filters varies largely with the season of the year. In summer the surface of the water in the reservoirs previous to filtering is often thickly covered with green vegetable matter, which forms with great rapidity. The upper film of sand requires cleaning on an average once a week. For this purpose the bed is emptied of water by a centrifugal pump, or otherwise and a layer of sand about three eighths of an inch in thickness scraped off and taken to be washed. Once a year the whole bed is made up anew. The washing is effected in a number of ways, one being by placing the sand in an iron cylinder seven feet six inches in diameter and three feet deep, having a perforated false bottom under which water is admitted under some pressure, and flowing up through the sand, stirs it up thoroughly and carries off the impurities as it flows over the top of the cylinder, the sand by its gravity remaining. When the water flows over clear the process is stopped and the remaining water drawn off by a cock. Another plan is to allow the sand to flow with a current of water down a flight of steps, the sand being caught in shallow ditches at the bottom while the water flows on with the impurities. Or again, a revolving cylindrical screen slightly inclined may be employed, a stream of water being admitted through the central shaft under pressure and allowed to play upon the sand, which is gradually washed through the meshes, while any lumps or stones are retained and fall out at the lower end of the screen.

PUMPING.

The pumping engines in use are of two classes, viz: Cornish and compound cylinder rotative engines. The advocates of each claim the superiority for their favorite style, and practically there is very little difference in the economy with which they work. On elaborate trials to ascertain their duty, they have raised from eighty to eighty-four million pounds of water one foot per hundred weight of Welsh coal, but with the ordinary Newcastle slack commonly used the duty is not seventy millions. The largest of the Cornish engines is at Battersea, being 112 inches diameter of cylinder with 10 feet stroke: it raises a weight of 75 tuns on a plunger 50 inches diameter. The steam is cut off at ·45 of the stroke. There are five other engines in the same building, with cylinders from 55 to 70 inches diameter, the latter being a "bull," or engine with the pump directly under the steam cylinder, and worked directly by the piston rod. Steam is furnished by 19 boilers, from 28 feet to 32 feet long and 5 feet to 6 feet diameter. The cylinders are all steam jacketed.

The rotative engines have the high and low pressure cylinders close together and connected to the same end of the beam, the high pressure piston taking hold nearer the center, and hence the strokes are unequal. The expansion in these engines is eightfold, the steam being cut off at half stroke in the smaller cylinder. A number of this class are of the following dimensions:—High pressure, cylinder 28 inches diameter, 5 feet 3 inches stroke; low pressure, cylinder 46 inches by 8 feet stroke. The pumps are of the bucket and plunger type, with a stroke of 7 feet, the buckets being 24 inches diameter, and the plungers 17 inches, or half the area of the bucket. The pressure of steam is 40 lbs. The pump valves are of the double beat construction, with brass and soft metal bearings. In other cases wooden seatings are used. The steam pistons are packed with steel rings three quarters of an inch square, on Ramsbottom's plan: these are used in cylinders up to 60 inches diameter.

The engines pump the water through mains to reservoirs near the city. These are almost invariably covered, brick arches being used for this purpose. Some of the works also pump a supply of unfiltered water to be used for street watering in summer. The water works show a good deal of first-rate engineering, but the supply is intrinsically only passable.

Slade.

[For the Scientific American.]

HOW SHALL WE BURN COAL MOST ECONOMICALLY?

The smoke burning apparatus of Messrs. Roby, illustrated in the last number of the Scientific American, has caused some comment in English mechanical journals. The results are declared incredible and the principle paradoxical. It does not seem so to me, for reasons which I shall state presently. The invention is simply, as may be seen by the engraving, a device to reduce the tube area at the smoke-box end, by contracting the orifices of the tubes, thereby choking the draft apparently, and, as it would seem, retarding the combustion in the fire-box. That this result does not follow we have the public statement of Messrs. Roby; and from my own convictions I have no doubt of great economy from the use of it. It is generally conceded that but a tenth part of the heating power of fuel is utilized, the rest being dissipated in various ways: it is lost, at all events, to the pocket of the manufacturer. To save a portion of the missing nine tenths has been the object of inventors for many years, but in my opinion more attention has been given to devising peculiar shapes and motions for the steam engine to cut off the steam at any desired point of the stroke than in seeking greater economy by more perfect combustion in the boiler.

While such inventions are both desirable and necessary, it seems to me that in this respect the steam engine is as near perfect as possible, and that the proper place to save the fuel is in the boiler, a good steam engine with a good variable automatic cut-off being assumed in all cases. This is only another way of saying that fuel is improperly burned, or burned to waste, which is just what I desire to say.

© 1867 SCIENTIFIC AMERICAN, INC.

If by any means whatever, by the employment of natural or artificial draft, we can urge the combustion of fuel and yet retain the heat or detain it from being driven off before it has given up its calorific power—if, I say, we can do this at a moderate cost, we shall obtain something approaching perfect combustion, and far greater economy than we have at present. A steam boiler furnace is in the nature of a retort for distilling the gases from the coal and applying them to the evaporation of water: but from its defective construction the gases are allowed to pass off without being ignited and the principal agents from which heat is derived are lost. In Siemens's furnace and in some others the gases are consumed in a combustion chamber, which is supplied with air when the gases are at a proper temperature to ignite, and great economy is the result. The same principle has been adopted in other ways, and the value of a given quantity of fuel noticeably enhanced. It has even been applied to cooking stoves with good results.

The efficiency of Roby's apparatus is in my opinion owing to the detention of the products of combustion in the flues (not in the smoke box as many do) until they are at the proper temperature to ignite. This view seems to me reasonable from the fact that the smoke is consumed. Smoke contains not only the watery vapor evolved from the incandescent fuel, but also pure carbon in the form of soot, which is nothing but unburned coal and is usually deposited along the surface of the tubes. In this boiler, however, no soot forms, for the simple reason that none is made: it is burned with the gases in the furnace before it is "born." I do not think that this apparatus would be universally successful in all cases, as the temperature at which the gases would ignite without escaping from the boiler would depend greatly on the length of the tubes and the diameter of them, also the velocity with which they passed through the tubes. The velocity could of course be regulated by the dampers, for such they are in effect.

Many years ago an apparatus similar to this was invented, having the same object in view. It consisted of a series of slats like a Venetian blind, hung in such a way that the exit of the gases was delayed, but I know nothing of its efficiency.

It would also seem that this boiler must be fired or run for some little while as an ordinary boiler before throwing the dampers into gear; so as to allow the tubes to get hot enough to perform the office which is demanded of them. The increased evaporation may also be simply owing to the retardation of heat in the boiler by the dampers, checking the flow, as it were, and compelling it to give up its virtue: but in this case, unless combustion were nearly perfect, the tubes would soon be stopped with soot. No doubt if air in jets were admitted to the flues the result would be still more satisfactory.

I have no doubt but we shall find in the future that multitubular boilers are imperfect both in point of expense and heating surface. If we can get the same amount of fire surface in another form, I do not see any good reasons for continuing to use many-flued boilers. They are always leaking, get clogged with soot unless anthracite is used, are in no wise efficient in proportion to the amount of heating surface exposed to the fire directly and of that most remote from it, and are always a source of anxiety.

I do not see any reason why a funnel turned bottom side up would not represent a plan for an economical steam boiler. In this case we should have enormous grate surface which would enable us to carry light fires instead of piling coal on a foot deep as is universally the case. We should then roast the gas out of the coal and burn it in the boiler, not at the top of the chimney as is now done; we should have large fire surface, plain in form, to which no soot could adhere, and if necessary we might fill the top with short flues that could be easily cleaned and repaired and in which there would not be 600 degrees difference in the heat at the ends, as is now found. I noticed a boiler of this general plan in a late number of the London *Engineer*, as built by Messrs. Shand & Mason: but this design was made by me and described to the Editor of this paper a long time before the engraving appeared. This form of boiler would not require to be so large for a given efficiency, I think, as a locomotive boiler, (though I do not assert this for I have made no calculation) and could be as readily braced as any other generator.

Economy of fuel is a question of the greatest importance, and it seems to me that appliances, such as cut-offs, are often mistaken for principles, though I do not wish to be thought hostile to working steam expansively in saying so. I am confident that we are on the eve of reform in this respect, and that where we at the best evaporate ten or twelve pounds of water for one pound of coal we shall increase the evaporation four fold. EGBERT P. WATSON.

New York, Jan. 23, 1867.

VARYING IDEAS OF MODEL MAKERS.

In our last issue we spoke of model making as a business, and alluded to the beauty of which models are capable. It is singular to see what varying and sometimes crude ideas persons who attempt to ultimate their notions into visible forms have in relation to what constitutes a proper model. We have frequent opportunities to judge upon this subject. One of the most remarkable comparisons came under our observation a few days ago. One of the models was a simple household device, capable of being a working model if made no more than one inch square, yet it occupied almost as much room as an ordinary wheelbarrow, and was built in the most clumsy manner, of inch boards, fastened together with large nails, and betraying, in shape and workmanship, the clumsiest and crudest mechanical ability.

The other was a model of models. A grindstone for household and shop purposes, which could be secured temporarily to the edge of a bench or table, having its trough for water, its rest for the implement to be ground, and a scraper or detainer to prevent the water from escaping by centrifugal force. The stone was a real grindstone, and the frame was of brass, a perfect working model, complete in every part, yet weighing less than one ounce, and occupied less than a cubic inch of space. One was the effort of a man who either possessed small mechanical abilities or felt no pride in his handiwork, and the other was the product of a true mechanic.

Editorial Summary.

AMERICAN GREATNESS.—If the Yankees have acquired the name of great boasters they may be excused on the ground of having so much to be proud of, even in the natural features of their country. The greatest cave in the world is in Kentucky; the greatest river and the largest valley in the world are the Mississippi river and valley; the largest inland sea of the world is Lake Superior; the greatest mass of solid iron is the Iron Mountain of Missouri; the Falls of Niagara is the greatest cataract in the world; Chicago is the largest grain port and lumber market; New York has the largest acqueduct in the world, while Pennsylvania contains the largest deposits of anthracite, and Illinois the greatest extent of bituminous coal fields in the known world.

THE FIRST SUBAQUEOUS TUNNEL IN AMERICA.—Chicago, having made a good beginning, goes on tunnelling. The next work in order is a tunnel under the Chicago river, where it is crossed by Washington street, which will be 1,800 feet long, having two passage ways for trains, each eleven feet wide, with a third for general purposes. The masonry will be protected by a heavy sheathing of lead. Instead of boring under the bed from the ends in the usual way, this tunnel will be constructed by sections in coffer dams, taking up a portion of the river bed at a time, so as to obstruct navigation as little as possible. We see it stated that the contractors have agreed to complete the work in March, 1868, for $271,646·04—mills, we suppose, not counted.

OUR WONDERFUL CLIMATE.—Here we are in the midst of what is conventionally called "winter," with roses blooming in the open air, strawberries ripening as in summer, orange trees in blossom where there are any orange trees at all, bouquets of open air violets selling at a bit on the streets, second crop apples that have just ripened exhibited in market, and grapes that have never suffered from contact with sawdust, still plump, plentiful and cheap at all the fruit stands. Gardening to supply the city with early vegetables has actively commenced around the bay, and young radishes and green peas can even now be bought at luxurious prices. Winter! The word should be abolished from our vocabulary as a superfluity.—*San Francisco Bulletin, Dec. 29th.*

MERCURY IN HUMAN REMAINS.—A French journal relates a story of a wealthy farmer who died many years ago, and on digging a grave in close proximity to where he had been buried, the bones were accidentally exhumed. On examination brilliant particles of a metallic luster were found, which on being collected presented a considerable quantity of oxide of mercury. Thus for thirty-five years the mercury had been preserved almost without alteration in the body of the deceased who had probably made frequent use of the metal during the latter part of his life.

MORTALITY AMONG MINERS.—In the county of Redruth, England, which abounds in copper mines, it is stated that in every 100,000 of the population 220 males annually die of pulmonary diseases more than females, This is not so bad as in the lead-mining districts where the excess is 320 in every 100,000 and the death rate of men is double that of women. In the tin-mining districts of Penzance the superior waste of male over female life in the mining population of all ages is 104.

SUBTERRANEAN CITY RAILWAYS.—The London tunnel railway, with its enormous cost, from peculiar local conditions, of five and a half millions of dollars per mile, has paid from the start, five per cent in 1863, six and a half per cent in 1864, and seven per cent in 1865, which are considered very large returns for money invested in England. Over twenty millions of passengers were conveyed by it in 1866.

NATIVE SILVER.—The most celebrated silver mine in Europe is that of Königsberg, in Norway, which is 180 fathoms deep. In the Museum of Natural History at Copenhagen an enormous mass of native silver is on exhibition, taken from this mine, which measures six feet in length, two feet in width, and eight inches thick, and is estimated to contain five hundred pounds of pure silver.

PHOTOGRAPHERS who use large quantities of nitrate of silver should allow all the excess of silver acetic acid and other matters from the plates undergoing development to run into stone jars containing fragments of zinc. By this means the metallic silver may be collected, digested with dilute sulphuric acid, washed and dried in the oven, and thus by a little pains quite a large saving may result.

STREAKY WEATHER.—During the tremendous rain storm of December 20th in California, a curious exception is reported to have occurred at Fair Oaks, near Menlo Park, where for the greater part of the day little rain fell; men plowing in their shirt sleeves while torrents were falling at San Jose and Redwood City, on both sides. The rainfall at San Francisco was 7·16 inches in 20 hours nearly double the heaviest on record.

SMALL ARMS IN THE WAR.—A report by the Chief of Ordnance shows that the Springfield armory furnished 801,997 new rifled muskets, of calibre .58, for the suppression of the rebellion, average cost $11.97; besides 670,617 of the same description purchased of American manufacturers at $19.23 and 54,117 at $28.15: 393,961 breech-loading carbines were purchased of American manufacturers at an average of $22.73, and 359,449 revolvers at $15.92, with 548 at $6.10. Foreign arms: 428, 292 Enfield rifles, at $20.07; 736,049 other muskets at $13 66; 10,251 carbines at $6.90; 12,374 revolvers at $16.57. This foots up nearly three and a half millions (3,467,655) of small arms of all sorts and sizes.

STATIONARY-ENGINE PLOWING.—Mr. James Howard, the implement maker of Bedford, Eng., patents a mode of working two gangs of steam plows or cultivators by two stationary engines on opposite sides of a field. Each engine has two winding-drums, one connected with each gang, by means of which each is drawn to the meeting point in the middle of the field by one of the engines, and then drawn back by the other engine while the other gang goes forward; all without shifting the connections.

A FRENCH FIRE ALARM, invented by M. Robert Houdin, the well known ex-conjuror, is set in operation by the action of a very slight degree of heat upon a thin metallic strip formed of a ribbon of copper and another of steel, soldered together by their flat surfaces. The copper expanding by warmth more than the steel, bends the strip so as to bring it in contact with a conductor and complete an electro-magnetic circuit, causing an alarm bell to ring continuously as long as the warmth is kept up.

EXTINGUISHING FIRES by the gaseous products of combustion, is an expedient which has been brought forward in England by Messrs. Dawson & Broadbent. They propose to connect buildings, by means of pipes similar to the gas system, or otherwise, with reservoirs of gas collected from furnaces and cooled, from which it can be driven by steam power into any apartment in which a fire may occur; thus displacing and shutting off the supply of oxygen by the energetic interposition of incombustible gases.

SALT ON CITY CAR TRACKS.—One who knows, a Philadelphia conductor, says that to protect his feet from cold when the tracks are salted, he is obliged to wear boots that are not only double-soled, but that have two thicknesses of upper leather, and over these a pair of extra thick fur-lined moccasins, and even then he suffers from extreme cold." The City Council has prohibited the use of salt in the streets.

THE ELECTRIC LIGHT has been used on a large scale in the construction of the Northern Railway of Spain, to enable work to be done by night during hot weather, as well as in tunnelling, where the absence of ordinary combustion and its products proved a great advantage. The entire expense involved in illuminating a space of 4,000 by 1,500 feet did not exceed, as reported, $1.75 per hour.

FIVE SNOW STORMS have been experienced at New Orleans, in 87 years. In December, 1800, snow fell for the first time in twenty years. Snow again fell in 1817, and again on New Year day, 1822. The next snow storm was on February 8th, 1831, after which twenty-one years elapsed before the next snow storm occurred, in 1852. Since that period no snow has fallen in Louisiana.

A NEW COMPETITOR IN SUGAR.—The Sandwich Islands exported 3,005,603 pounds in 1862, and 5,262,112 pounds in 1863, and in 1864 the exportation almost doubled, having reached 10,414,441 pounds. New sugar plantations are constantly started, and the area of sugar land as yet untouched is very large.

THE GOLD AND SILVER PRODUCT.—The report of J. Ross Browne, Special Commissioner on the mineral resources of the States and Territories west of the Rocky Mountains, gives an estimate of the product for 1866 of gold and silver at $106,000,000 from California, Montana, Idaho, Colorado, Nevada, Oregon and other sections.

GOLD MINING IN VERMONT.—Parties interested report that from four to six mills will probably be put up next season at Bridgewater, Vt., for reducing the quartz of that region, and that a yield of from $15 to $30 per tun is expected. Work has been going on constantly during the past season, and four or five new and promising openings have been made.

SKATING GIRLS.—A young lady of fifteen summers (not winters) skated one day this winter from Minneapolis to Dayton, 40 miles, in six hours. Another miss of the same age is performing fancy skating to the admiration of large assemblies in western cities.

BREECH-LOADING RIFLES.—About eighty a day of the new breech-loaders are now being turned out at the Springfield armory, and the number will be constantly increased until in February two hundred will be the daily production.

THE PRUSSIAN LEGISLATURE voted to Count Bismarck $375,000, and to the war minister and five generals, 150,000 each, in acknowledgment of services in the late war. The presents were delivered on Christmas eve.

THE LONDON TELEGRAPH boasts a daily circulation of 138,704 copies—the largest daily newspaper circulation in the world.

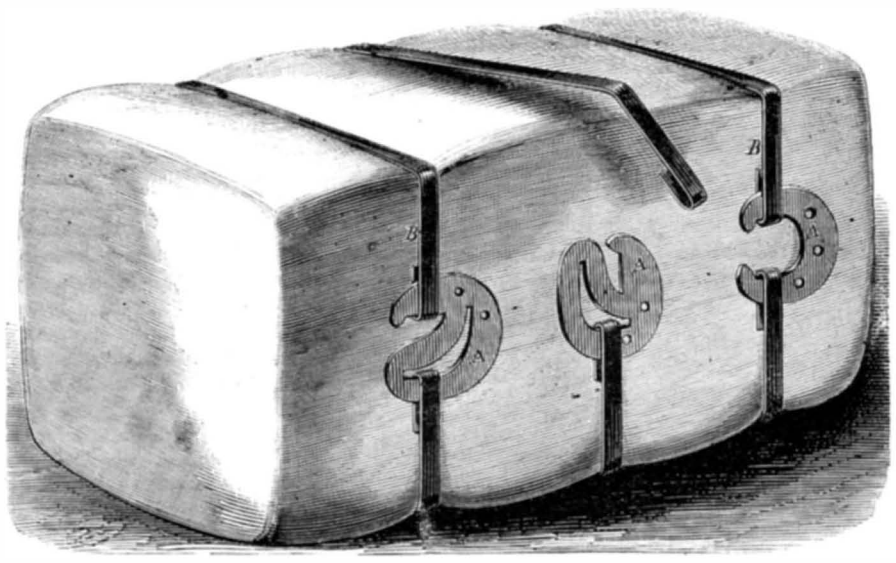
HEAVY PUNCHING.—The patentees of the punched gun manufacture have punched a 10½ in. hole down through a steel ingot four feet high and weighing three tons.

© 1867 SCIENTIFIC AMERICAN, INC.

Improved Metallic Cotton-bale Fastener.

Metal bands are fast superseding the use of ropes to fasten bales of goods, and especially for the purpose of securing raw cotton. It is well known that a bale of cotton as usually compressed is not readily combustible. It is only when the fastenings become loosened, allowing the cotton to spread and the air to permeate its mass, that free combustion is possible. If the fastenings are of rope—often tarred, or if not, of a loose texture—they soon burn away and allow the elasticity of the cotton to open its fibers to the flame. When the bale is opened the rope is frequently unfit for using again, and as junk, is worth only about 33 per cent of the value of the iron bands. But metallic bands, as used with this fastener, it is claimed, can be used over and over again.

The device consists of clasps, A, of metal—malleable iron being most suitable—in combination with bands, B, of hoop iron. The clasps may be of two forms as shown. Each has its peculiar advantages, although both are constructed on the same principle. In one form one end of the strap is passed through a curved slot, and in this the clasp can be removed by turning only one way. In the other, the perfect C-shaped, both jaws are alike and it can be turned either way, opening from either end of the strap.



BARBARIN'S METALIC COTTON-BALE FASTENER.

The bale, being under pressure, one end of the band is pssed around it and bent as shown at C, the other being bent at the proper point when the jaws are slipped through the loop. These loops may be riveted if desired, although the grasp of the fasteners is such that it is not considered necessary. The bearing of each jaw on the loop is perfectly square, as seen, preventing any accidental disengagement. When it is required to loosen the bands to open the bale, it can be done by means of the holes seen in the face of the couplers. By inserting a cotton hook in these the fastener may be easily slipped, when it and the band are ready to again do duty as fasteners.

The device is the subject of patents in this country and Great Britain, a United States patent having been obtained Oct. 20, 1866, and an English patent Oct. 29th, same year. The patentee is desirous of disposing of the entire right, Address Arthur Barbarin, Lock Box 691, P. O., New Orleans, La.

The Composition of Alloyed Metals.

Below are a few of the alloys commonly used in the arts:—

Chinese White Copper.—Copper, 40·4; nickel, 31·6; zinc, 25·4; and iron, 2·6 parts.

Manheim Gold.—Copper, 3; zinc, 1 part; and a small quantity of tin.

Bath Metal.—Brass, 32; and zinc, 9 parts.

Speculum Metal.—Copper, 6; tin, 2; and arsenic, 1 part: or copper, 7; zinc, 3; and tin, 4 parts.

Hard Solder.—Copper, 2; zinc, 1 part.

Blanched Copper.—Copper, 8, and arsenic, ½ part.

Britannia Metal.—Brass, 4; tin, 4 parts; when fused, add bismuth, 4; and antimony, 4 parts. This composition is added at discretion to melted tin.

Plumber's Solder.—Lead, 2; tin, 1 part.

Tinman's Solder.—Lead, 1: tin, 1 part.

Pewterer's Solder.—Tin, 2; lead one part.

Common Pewter.—Tin, 4; lead, 1 part.

Best Pewter.—Tin, 100; antimony, 17 parts.

A Metal that Expands in Cooling.—Lead, 9; antimony, 2; bismuth, 1 part. This metal is very useful in filling small defects in iron castings, etc.

Queen's Metal.—Tin, 9; antimony, 1; bismuth, 1; lead, 1 part.

Mock Platinum.—Brass, 8; zinc, 5 parts.

Ring Gold.—Pure copper, 6½ pwts.; fine silver, 3⅜ pwts.; pure gold, 1 oz. and 5 pwts.

Mock Gold.—Fuse together copper, 16; platinum, 7; zinc 1 part.

Scientific Snow Storm.

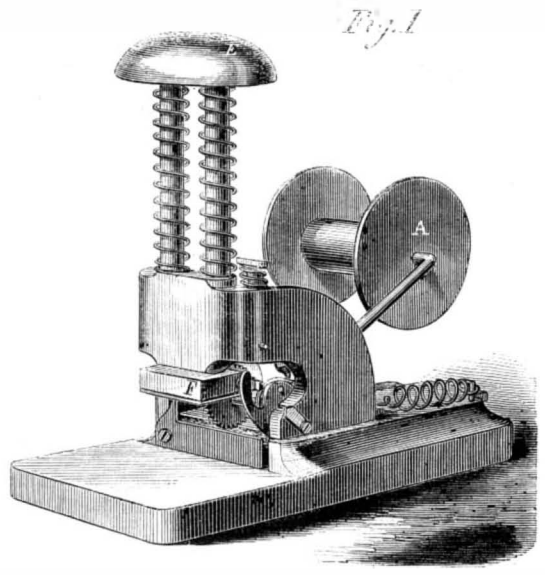
The *Springfield Republican* thus picks up the New York *Tribune* on its very scientific account of our recent snow storm:—"The snow storm in New York must have been astounding. Its effect upon the intellects of the metropolitans may be inferred from the philosophical deduction of the *Tribune*, that 'immense forces, imperfectly explained on the hypothesis of an ever-shifting vacuum, dwell in the atmosphere, and we are continually surprised by their action.' Up here in the country we know that snow is only frozen vapor, and that when the wind blows it drifts, and we are not in the least astonished thereat. The 'ever-shifting vacuum' we suspect to be exclusively metropolitan."

Government Tests for Iron.

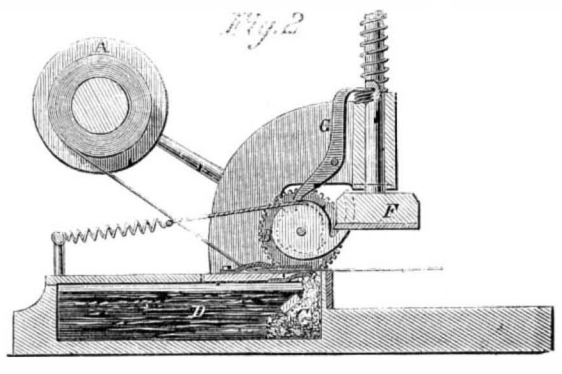
During the last few weeks considerable quantities of the plate iron sent into Chatham Dockyard by the contractors supplying that establishment have been rejected by the officials, on the ground of its alleged inferior quality and its failing to reach the standard of excellence insisted upon. The contractors have appealed to the Admiralty on the subject, and, after a long correspondence and numerous official reports, their lordships have upheld the decision of their officers. The standard of excellence insisted upon by the Admiralty is that the plate iron shall stand a strain of from 20 to 22 tuns to the square inch with the grain, and 18 to 20 tuns across the grain—a degree of excellence which, under the trials with the apparatus in use at Chatham, the iron rejected has failed to attain. The contractors, however, assert that the iron thus rejected is superior to the standard laid down, and refuse to submit to the dockyard tests, which, they contend, are not to be relied on, inasmuch as the testing apparatus is imperfect. In proof of this they have placed in the hands of the Admiralty reports from two of the most eminent iron testers, in which the samples of iron rejected by the dockyard officials were, on being tested by them, found to be of even better quality than the standard required by the board. Private and perfectly independent tests have likewise been made, and again the results have been adverse to the ruling of the Admiralty officials. Under these circumstances the firm more particularly concerned has intimated the intention of commencing legal proceedings against the Admiralty for the heavy loss they have sustained.—*London Times.*

Sill's Stamp Affixer.

The engraving represents, in perspective and in section, a handy office implement intended to obviate the slow and disagreeable process of affixing stamps. Where the amount of



correspondence is large, or in an office which issues many documents to which stamps are necessary to give them validity, the work of affiixing them is not only laborious but very annoying The friction of the stamps on the tongue and lips induces sores, and the operation, after long exercise, becomes painful.

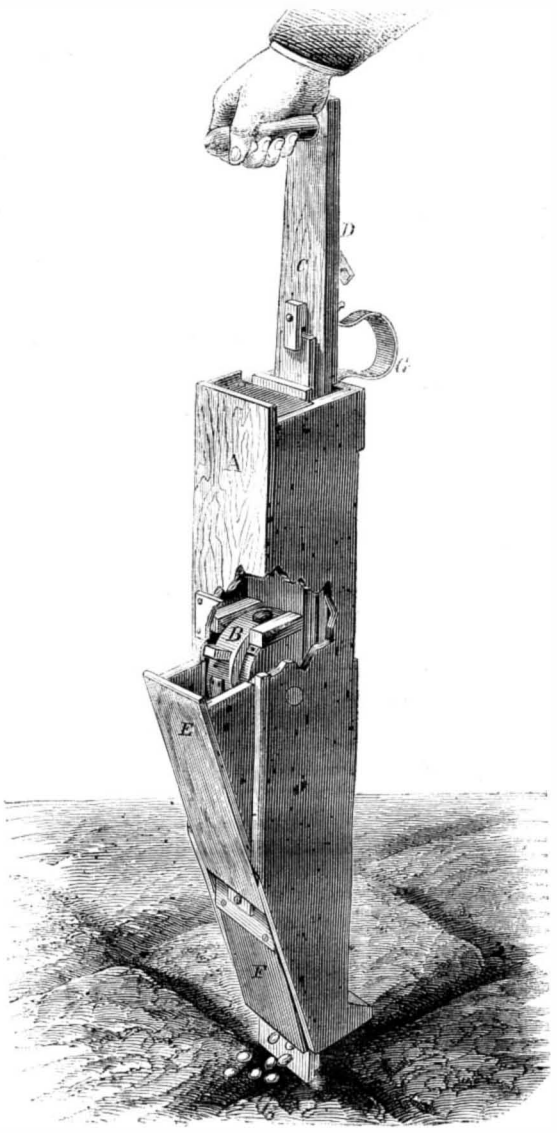


With this machine all this annoyance is obviated. The stamps in slips are wound on the reel, A, and led under the ratchet wheel, B, and over a sponge, C, in the water reservoir, D. By pressure upon the handle, E, the affiixer, F, is thrown down and the pawl, G, is actuated against teeth on the wheel, B, rotating it and bringing forward the strip the length of a stamp. The affixer or platen, F, has a steel edge on its inner surface which acts against a fixed steel blade on the platform, the two forming shears for clipping off the stamp. The pressure downward on the handle, E, not only moves the platen and cutter, but operates the pawl, G, thus rotating the wheel, B, and bringing forward the stamp to position. The upward movement of the plungers does not rotate the feed wheel as the pawl is prevented from acting by a minute coiled spring under its upper end. Its operation can be readily understood by an examination of the engraving.

Application for a patent is pending through the Scientific American Patent Agency, by C. B. Sill, Wilkins P. O., Pa. Address as above or at 308 North Sixteenth st., Philadelphia, Pa.

Batcheller's Hand Planter.

Those of our readers who twenty years ago were engaged in the operations of the farm can well remember the wearisome labor of dropping the corn from a bag suspended to the waist, the care required to place every kernel in its proper position, the difficulty of this performance on a windy day, and



the annoyance of seeing the corn come up in straggling blades, some in and some between the hills. All this is obviated by simple implements like that shown in the engraving. We have illustrated the instrument as in actual use, with a portion cut away to show the main working parts. Externally it is a rectangular box the lower part inclined at one side at an angle. The upper portion, A, is a seed receptacle, the bottom of it being formed by the roller, B. This roller is insured a partial rotation as the slide, C, is raised or depressed by the hand, by means of straps secured at one end of the periphery of the roller and at the other to another parallel slide, D, which raises and falls with C. The roller has a depression or cell on its circumference which by the rotation of the roller is presented to the seed in the hopper when the slide, C, is depressed. By raising the slide the roller is turned in the opposite direction and the seed is thrown into the trough, E, and falls to the bottom, where it it held by the spring plate, F, until a downward movement of the plunger opens the plate and permits the seed to escape. A simple device of a friction brush bearing against the periphery of the roller, retains the seed in the sell until it arrives in the proper position to be dropped; the strap, G, with a snug on the roller, determines the length of the reciprocating movement of the plunger, C.

No further description appears to be necessary to insure a perfect understanding of the device. It is the subject of two patents obtained through the Scientific American Patent Agency, and dated March 9th, 1858, and Oct. 13th 1863, by H. F. Batcheller, Sterling, Ill., whom address for rights, etc.

A New Anchor.

An anchor weighing twenty-six hundred weight called Martin's self-canting anchor, was lately tested by the Admiralty trial near Newcastle, England, which, after sustaining the full Admiralty proof of twenty-five and five-eighths tons was further tested by an additional strain of fifty per cent, and exhibited no signs of permanent deflection. The anchor is of peculiar shape and construction. Both arms, or flukes, take hold of the bottom and the steadying stock, set at a certain angle, and of a particular form, acts in conjunction with the arms and increases their hold to a great degree, especially on soft and yielding bottoms. As every usually projecting part is brought into action no portion really projects, so that fouling is almost, if not quite, impossible. Alongside the ship it cats as flat as a board. It is made without welds, being of three separate pieces,

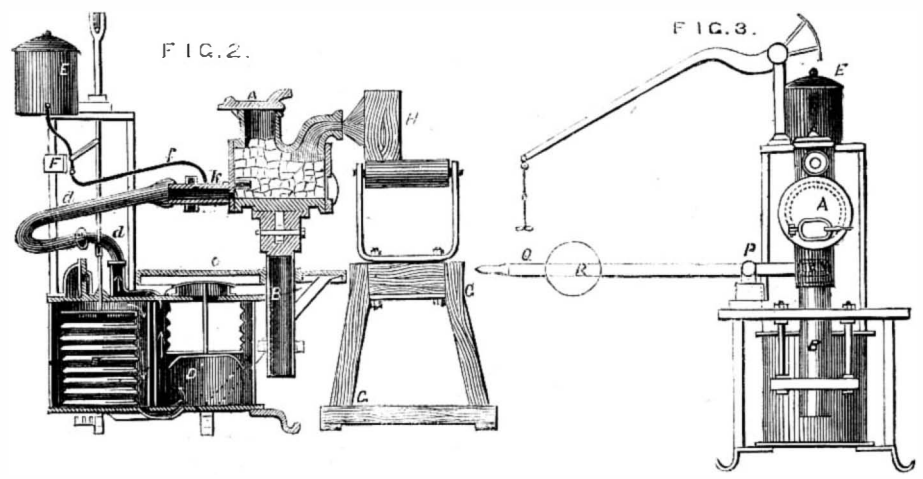
© 1867 SCIENTIFIC AMERICAN, INC.

Carbonizing Wood and Blasting Rock with Fire.

We give herewith engravings illustrating processes for carbonizing wood to be exposed to moisture and for disintegrating rock without the use of gunpowder. It was originally proposed by M. L'Apparent but perfected by M. Hugon. It is in use by the French Telegraphic Company, giving excellent results. We condense a discription from the London *Mechanics Magazine* translated from the *Annales du Conservatoire Imperial.* The invention consists in a movable and portable furnace and a reflector which is a curved plate, M, Fig. 1, from 12 to 16 inches diameter, mounted on a vertical shaft on the tail piece, C, Fig. 1, of the bench, G, Fig. 2. By means of this tail piece any timber placed upon it and exposed to the jet of the furnace has every part presented to the action of the flame by the reflective powers of the plate, M. The ends of the posts or piece of timber are carbonized by means of the lever, N, Fig. 1, which turns the whole movable support with the plate, M, around the central point, O. Fig. 2, is a vertical section of the whole apparatus and Fig. 3, an elevation. A, is the furnace for coal with a door at the top for introducing the fuel; B, is a movable column supporting the furnace and allowing it to be raised and lowered by the lever, P Q, with the counterpoise, R, or moved horizontally around its axis. D, Fig. 2, is a double bellows injecting air below the furnace through the reservoir, D′ and a flexible tube, *d*; E is a water reservoir; F is a cock for introducing water into the reservoir, D′, and *f* a small pipe for injecting water upon the blast in *k*. A sleeper or other piece of timber is represented at H, exposed to the flame. The railway company at Vierzon, carbonize 288 sleepers daily with four mabhines, at a cost of less than one centime per stick.

Fig. 4 shows the application of this device to rock cutting. For this purpose the apparatus is mounted on wheels running on temporary rails *c*. In the engraving A is the furnace; B is the door for chargingit; H is the air blast pipe; F is a cock communicating with a reservoir to regulate the quantity to be injected into the air passage, and G, a valve to intercept the blast. The concern is so arranged that by a lever it can be inclined at any angle to direct the force of the flame upon any portion of the cutting. It takes only about 15 or 20 minutes after starting the fire before the flame blast is sufficiently strong to work effectively. The intense heat, thus generated by the acid of the air blast and the decomposition of the water, rapidly breaks and splinters the rock. The furnace is then removed and cold water thrown against the rock dislodging large quantities of the obdurate material.

It is said that in the hardest rock, as quartz, this apparatus can dislodge triple and quadruple the amount which gunpowder can. It is the application by improved devices of a principle known and used from the earliest times by the most uncivilized of people.



APPARATUS FOR CARBONIZING WOOD AND BLASTING ROCK.

A New Movement for Locomotive Throttles.

It is stated that an engineer of Greenfield, Mass., has invented a new movement to take the place of the common lever on throttle valves for locomotives. In this improvement the throttle is moved by right and left screws attached to a wheel from twelve to eighteen inches in diameter. The throttle valve cannot be moved unless the wheel is moved, and, in attaching the wheel, friction enough is produced by putting a large thumb screw through the yoke or frame so that the wheel will remain stationary at the ordinary pressure of the steam. Two of these valve movements have been applied on locomotives on the Hartford and Springfield Railway, and the engineers find them a great improvement on the lever arrangement.

From this brief statement, which is all we have to guide us in forming an opinion, we should suppose that the action of the device would not be rapid enough for all contingencies. There are cases where the engineer needs to shut off his steam instantly, reverse his engines, and apply the steam again at once, as when an obstruction is on the road and a collision is to be avoided. Whirling a wheel, however rapidly, which actuates a screw, occupies time, and we think some quicker-acting device might be contrived which would be superior to the commonly used lever and at the same time obviate the supposed objections to this.

Wind Mills in New York City.

Minnit, the first Dutch governor, built, according to Moulton, "two or three wind mills at Manhattan, by which corn was ground and boards sawed." One of these, a flour mill, stood on a hill which occupied a part of the present Battery, so near the fort that the latter, which was rebuilt by Van Twiller, in 1633, intercepted the southeast wind, and rendered the mill nearly useless. But one of three wind mills previously erected was in operation in 1638, when Keift came to the government.

On one of their farms, of which they reserved several in different parts of the island, the West India Company erected a "Wint molen" (wind mill) for the use of the town. It stood near Broadway, between the present Liberty and Cortlandt streets. After having gone to decay, it was ordered, in 1662, that there be another erected on the same ground, "outside of the city landport (gate) on the company's farm." "Old Wind Mill Lane," running from Broadway to Greenwich street, and between Cortlandt and Liberty street, upon which it probably stood, was, in Lyne's survey of New York, in 1729, the most northern street west of Broadway, all beyond being the King's farm.

Mills of this class were also built by private enterprise. Jan Teunizen had a wind mill in 1665, which was standing sixty years after, near the corner of Chatham and Duane streets. This mill was then some distance beyond the limits of the city, on the public road.

The bolting of flour, in those days, was usually carried on as a separate business, and in establishments constructed for that purpose, sometimes at a distance from the grinding mill and often as an appendage to the bakery. During the operation of an Act of the Assembly, made in 1684, giving to New York the exclusive right of bolting flour within the province, mills sprang rapidly into existence in the vicinity of the town, and the manufacture of flour became a principal source of emolument to the city. Two years after, under Governor Dungan, the city received a new charter, giving additional municipal privileges, and confirming the ancient Dutch franchises. A new seal, more rich and elaborate than the old one, was now granted the city, which, as indicative of the principal sources of its prosperity, retained the beaver to represent its ancient commercial interests, and added a wind mill and a flour barrel as emblems of its present industry.

A wind mill once stood on the hill in the rear of the old jail, or the present Hall of Records, and an eminence near the Chatham Theater was called "Wind Mill Hill." In 1760, John Burling advertised for sale a wind mill near Bowery Lane, having two pair of stones.

CONVERSE'S IMPROVEMENT IN POCKET FIRE-ARMS.

Our engraving illustrates an admirable little improvement in pocket repeaters, the invention of Mr. Charles A. Converse,

of Norwich, Ct., which he has very appropriately christened the "Ladies' Companion." It is not much larger than a good sized knife, our cut being almost the actual size of the article. The improvement consists in the use of a short pivot, *b*, upon which the rear of the barrel, *a*, turns, and in the use of a ring, *c*, which clasps the barrel, and while permitting it freely to revolve, secures it firmly to the stock of the pistol. To remove the barrel it is only necessary to loosen the screw, *d*. This little repeater is an elegant specimen of Yankee simplicity and mechanical skill. It is used with metallic cartridges, which are inserted at *e*.

The pistol can be loaded and fired with great rapidity, is simple to the last degree in construction, therefore durable and little liable to disorders. We have yet to see a five-shooter which combines so many practical excellences in so small a space, and is sold for so low a price as this. The "Ladies' Companion" is a decided success and we think will have an extensive introduction. Patented Aug. 28, 1866. Manufactured by the Continental Fire-Arms Company, Norwich, Conn., Charles A. Converse General Agent.

Chunks of Gold.

We copy from a California paper an Alladin-like statement, with comments, on the discovery of gold nuggets. It says that the miners in the Woodside Quartz Mine near George- town were "blocking out a nearly pure, solid mass of gold three feet in length. If such a statement had come from a stranger, we should have received it with incredulity, but we can vouch for the sincerity and intelligence of the author of the message. The finding of gold in such large masses in a lode, is without a parallel in the history of mining. The metal in veins of auriferous quartz is usually in small particles, and pieces are very seldom obtained weighing more than a few ounces. Probably the largest piece of gold heretofore taken from any lode in this State did not weigh more than a pound. But our telegram mentions one lump, obtained in the Woodside Mine, weighing 100 pounds, and it is implied that the piece three feet long will weigh very much more. The large nuggets, however, which have been found in the placers, must have come from quartz veins. Australia produced one nugget weighing about 225 pounds; and in 1854 a lump of 160 pounds was obtained in Calaveras county; and this State has produced a multitude of nuggets weighing ten or twenty pounds. All these must have come from quartz veins, and surprise has been expressed by several writers that the particles of the precious metal found in our lode mines are so small. If the accounts from the Woodside Mine should be verified, our largest mass of gold must hereafter be credited, not to placer deposits, but to quartz. It is worthy of note that the Sonora *Democrat* of the 3d inst., asserted that, in the previous week, some Italians had found a streak of gold four inches thick in a quartz mine in Deer Flat, Tuolumne county, and had to cut out the metal with cold chisels. This report was considered so improbable that it scarcely deserved repetition, but it may be true for all that. A number of the quartz mines of the State are yielding better now, at great depths, than everbefore, and the confirmation of these statements from Georgetown and Deer Flat would assist to give a new impulse to the branch of mining which must be the chief reliance of our gold miners in the future."

Snow in Cities.

It is curious to note how the same circumstances are viewed in different localities. *The Engineer*, London, says:—"The large masses of snow at present lying in our streets impede the traffic to an enormous extent. Why do not the authorities adopt some measures to remove it? We have seen the scavengers, employed in clearing the street gutters, deliberately throw the snow they had removed into the middle of the street."

This complaint sounds queer to the dwellers hereabouts. In Boston, if not in this city, the "scavengers employed in clearing the street gutters," are employed for the very purpose of throwing the snow into the streets. That is just where we want it. Where else? Certainly if we clear our *trottoirs* and gutters for the passage of pedestrians and water, we can do no less than to give the results of our labors to our sleds and cutters. We want snow in our streets. It is easier for horses, more comfortable for men, and profitable to owners of sleigh teams to let.

Cost of a Newspaper.

Some idea of the vast expense attending the publication of a first-class daily paper may be inferred from the annual statement made by the *New York Tribune* Association.

The gross receipts from subscriptions, sales, and advertising, in 1866, amounted to $909,417. The expenses were $885,158, showing a net profit of but $24,259 to be divided among the stockholders.

ITEMS:—The printing paper cost $418,199. Pressmen and Compositors, $133,000. Editorial expenses, $81,775. Correspondence, $49,300. News by Telegraph, $58,776. Mailing, counting, and packing papers, $35,000. Taxes on advertising, $10,082, besides many other expenses of less magnitude, but which help to eat up the profits of the publishers. In 1865 the receipts were $816,537, expenditures $646,107, showing a profit of $170,430. The combined circulation of the various editions of the *Tribune*, daily, weekly, and semi-weekly, probably exceeds that of any other general newspaper in America.

© 1867 SCIENTIFIC AMERICAN, INC.

Correspondence.

The Editors are not responsible for the opinions expressed by their correspondents.

Earth Worms---How and What they Eat.

Messrs. Editors:—I see that you have published an article about the habits of earth worms, which useful little creatures seem to be much underrated. They may eat earth, as your author asserts, but I have never seen them do it, although I have seen them eat other things with great voracity, and have also seen them reject particles of earth which adhered to their proper food, such as dead spears of grass, roots and leaves.

I have watched them feeding for hours at a time, and retain a lively recollection of several rheumatic attacks, resulting from the wetting I got while so watching them. They feed at the surface only when the withered vegetation is wet with rain or dew and is in a soft and pliable state. When their food found at the surface is dry, and too harsh for their mouths to manage, they retire to the congenial depths of the ground, delighting in heaps of "long" manure, which they reduce to a homogeneous mass of compost with great rapidity by consuming the vegetable and undigested parts thereof, thus transforming the matter from a vegetable to an animal character, leaving the mass at its lowest chemical status and so fit for the food of plants. Indeed I doubt if any atoms of vegetation can decay and be again fit food for other vegetable organisms without an intervening decomposition in animal digestive apparatus. At all events, it is easy to prove that earth worms are the compost makers, and if we do not give them time to properly manufacture their "product" while the manure is in the compost heap, they will appear in the fields and then complete the job, and further, their work in fields yields another benefit by their boring and opening of the soil.

Their manner of eating is worth noticing. If you seat yourself upon a grass plat or beside the strawberry bed, during a light rain in warm weather, and have the patience to sit perfectly still for ten or fifteen minutes, you will see innumerable worm heads protruding cautiously from the ground, and feeling around until a spear of soft and recently killed grass is found. The worm touches it first with the extreme point of the head, and then the point retracts inward, much like the toe of a stocking when you touch it with your finger to commence turning it: then the worm shortens its length, the other end being fast anchored in the hole: this action makes a bight in the spear of grass, and then the worm crawls along the outside of his supper until the parts diverge too much, when he takes another pull, and so on until the grass is loosened from its own roots and safely swallowed. I have observed that if a particle of earth adhere to the food it is shoved along as the swallowing progresses, and not allowed to enter the mouth. The final act of swallowing the end, and biting off the lump of root which is sometimes attached, I have never seen, as that is performed within the hole: but I have frequently seen the worm re-appear with a pellet of earth balanced upon his head, or it may be only the piece of root if his supper was clean, which he deposits at the surface beside his hole, when he prowls around for more food while it is good.

When two worms seize opposite ends of the same spear, the pulling and hauling is most comical, reminding one strongly of his early days when he strung grains of corn upon opposite ends of a string and fed two rival gobblers. The worm fight generally ends by the breakage of the grass, but if too strong for their strength they both swallow until their heads touch each other, when they both "get," leaving the morsel, which they will not touch again. I have often seen these worms breaking off the dead parts of strawberry leaves, rejecting the living parts, and have also seen them apparently sucking the pollen from strawberry flowers. In the fall large tufts of dead leaves may be seen drawn partially within the worm holes, possibly by way of stoppers to keep out the cold. * * *

Science Familiarly Illustrated.

Why Water Presses Sideways and Upward.

"Truth is stranger than fiction." The young philosopher is surrounded with mysteries and is called upon to accept as fact what seems to him incredible. Many of the fundamental truths of natural science are apparently inconsistent with his everyday experience and observation. It certainly is not all stupidity which makes the boy slow to learn that the earth is round, that the sun is bigger than the earth, and that the air has a weight which squeezes up his body with a force of five or six tuns. It is probably the case that the children who do learn these things, are helped on more by their natural credulity than by conviction of the judgement. And there are many grown up people who remember only the outline of facts taught them in childhood, and have never troubled themselves for reasons about them. How many skillful mechanics can give good orthodox scientific reasons for the fact that water presses sideways and upward as well as downward?

Bodies which make a pressure in consequence of their weight generally press downward only, and this pressure is exactly proportioned to the weight. In fact the pressure and weight in our common experience are the same thing, and upon this conception of the case our balances and other weighing machines are constructed. The weight is due to the force of gravity which pulls in no other direction than downwards, or towards the center of the earth. Then why can there be any movement sideways or upwards?

If a lot of bricks be piled on top of each other the pressure will be only downward, and there is no tendency in any other direction. But if we try to pile up sand in the form of a column we know it spreads out at the bottom, and thus in this case there is a tendency or pressure sideways. The reason of this can be made very clear by observing what takes place when a few grains only of sand are experimented with. Sand, however, is composed of little rounded pebbles, and it is better for the experiment to take large pebbles or bullets, as they can be better seen. Place two pebbles side by side, and then a third over and between them. The result is that the two are spread apart and the third falls between them; the third pebble has acted like a wedge to divide and push them laterally. Now what takes place in our experiment may by careful observation be observed in heaping a large body of sand.

Take a tube shaped like the letter L and pour in sand at the top and soon it runs out at the side and with a good deal of force. If the tube be shaped like the letter U, and the sand be poured in at one end it will rise up in the other. In these simple experiments we have plain illustrations of lateral and upward pressure. But it will be observed that the sand loses force in moving and that it will not go very far in the horizontal part of the L tube nor rise very high in the U tube. The reason is simply that the particles of sand are rough and the friction stops the motion; our sand needs to have a lubricator. The particles of water seem to be very smooth and slippery, so that none of the lateral and upward pressure is lost by friction, and the sideways and upward pressure at any given point are equal to the downward.

Machines Mediums and not Reservoirs of Power.

One notable fault with most young mechanics is the belief that machinery is a source of power—that mechanical appliances not merely transmit the force first exerted, but increase its power. In fact, this belief is shared sometimes by those of experience enough to know better, and is the source of the enormous waste of ingenuity and mechanical ability shown in the attempts at mechanical impossibilities and especially in the never-ending experiments for the discovery of a perpetual motion.

Mechanical appliances increase our ability to move objects, but so far as they do this they compel a loss in velocity. For instance: By the use of a lever a man may lift a rock which unaided by this simple means he would be unable to move, but if he could lift it without this aid he could move it much more rapidly. The lever is one of the most powerful of the simple mechanical powers. Archimides was not a senseless boaster when he said: "Give me a fulcrum for my lever and I will move the world." Its value may be seen in the common steelyard where a poise of one pound on the extremity of the bar will counterbalance one of a hundred at the end of the shorter arm. The safety valve lever is an example being what is called a lever of the second class, the weight being between the fulcrum and the power. In this device a weight of a few pounds or a spiral spring counterbalances the pressure or weight of hundreds of tuns.

The pulley and the gear, although not often classed as related to the lever, may be considered as modifications of the same mechanical power. The pulley may be called a double lever, having a common fulcrum in the shaft. So the gear acting by its cogs or teeth on another gear may be considered a lever. None of these are motors or originators of power but only conveniences for its transmission. Indeed they do not transmit all the power which they receive, as friction of the parts absorb or divert a certain percentage of it.

The inclined plane is commonly classed among the rudimentary mechanical powers, but this is hardly correct unless we make a double incline, as the wedge, or a spiral incline, as the screw. In fact the lever is at the root of all mechanical powers, and all others partake, more or less of its nature.

STEEL-HEADED RAILS.

We published in No. 4, present volume, diagrams of a new steel-headed rail for roads and of the pile from which it was forged. Rails with steel faces have been used, the steel being simply a plate welded on the top of the iron. They did not prove very successful from the difficulty of making a perfect union of the two metals, and from the fact that the inside lip of the wheel abraded the iron, contributing to a more rapid deterioration. Since publishing the description of the improved steel-headed rail we have seen cross sections of them which show a perfect weld between the iron and steel, which we are informed by Mr. S. L. Potter, the Superintendent of the Wyandotte Mills, at Wyandotte, Mich., is obtained without the use of a flux and the result is secured by the pecular method of making the pile for heating. These rails are steel, not on the upper face alone, but on the sides sufficiently to take the wear of the wheel lips. They are used on several of the western railroads and give perfect satisfactfon. As they cost at the present price of steel only about forty per cent more than iron rails and much less than rails made wholly of Bessemer steel, they seem well adapted to supersede the ordinary rails whenever they are removed. Railroad men who are interested in the subject of steel rails would do well to correspond with Mr. Potter, at the Wyandotte Mills, as above, where the rails are at present manufactured.

The proportion of ammonia contained in rain water is liable to considerable variation. In one million parts of rain water collected in Paris during the last five months of 1851, Barral found 3·49 parts; Boussingault, at Liebfraunberg, in 1852, found only 0·744 parts; Lawes and Gilbert, at Rothamstead, in 1853 and 1854, found the average amount from March to August to be 1·42; from September to February 0·927 parts, or about one grain of ammonia in fourteen gallons of water.

Recent American and Foreign Patents.

Under this heading we shall publish weekly notes of some of the more prominent home and foreign patents.

Explosive Compound.—H. A. Bleckmann, London.—Dated May 10, 1866.—This improved composition is composed of the following ingredients: Sawdust or other particles of wood, or other cellulose substance in a finely reduced or comminuted condition; saltpeter, or nitrate of potassa, and charcoal or carbon, and sometimes ferro-cyanate of potassium. These materials, that is to say, the sawdust or other cellulose substance, the saltpeter or nitrate of potassa and charcoal, with or without the ferro-cyanate of potassium, form or constitute, when mixed together, a compound or agent which will not explode by impact, ramming, or friction, but only by ignition or the application of fire, or very strong heat.

Treating and Applying a Certain Vegetable Plant for the Purposes of the Tobacco Plant.—F. C. Buisson, Natiat, France.—Dated April 21, 1866.—This invention consists in treating the leaves of the tuberous sunflower or Jerusalem artichoke (*helianthus tuberosus*), and applying them to the purposes for which the leaves of the tobacco plant have been employed. The patentee collects the leaves of the tuberous sunflower, dries them, and submits them to the operations to which the leaves of the tobacco plant are ordinarily submitted in order to manufacture therefrom a tobacco for smoking—cigars, rolls, cakes, snuff, or other usual forms. The smoke arising from the tuberous sunflower leaves, when thus heated, is odorous, sweet, and slightly acidulous; it is not acrid, and has no poisonous effect.

Director.—W. G. Grant, Wakeman, Ohio.—This invention relates to a director for inserting a sponge or other similar or suitable pessary into the vagina, to act as a support to the mouth and neck of the uterus, in cases of female weakness.

Chemical Process.—René Cupper, New York City.—This invention relates to a process for the extraction of iodine from sea water, which is accomplished by precipitation.

Chimney Top or Cap.—W. F. G. Beeuwkes, Holland, Mich.—This invention relates to a top or cap for chimneys. The principal object of this invention is to prevent the roof of the building through which the chimney extends, from becoming heated by the action of the heated currents of air and products of combustion passing through the chimney.

Copy Holder.—Charles B. Moseley, and Lucius L. Woolley, Medford, Mass.—This copy-holder is specially intended for the use of compositors, although it can be readily and easily adapted for use by various persons such as copyists of legal and other papers, proof-readers, etc.

Saw Set.—W. A. Alexander, Mobile, Ala.—This invention relates to an improved device for setting saw teeth, and consists of a clamp formed in two parts, one of which parts contains a recess for receiving the saw tooth when it is bent as desired, by means of a lever in the other part, the extent of the deflection of the tooth being regulated by a set screw in the recess, which limits it as desired.

Vise.—James S. Ralston, Indiana, Pa.—This invention relates to an improved plan of construction of a vise for blacksmiths, carpenters, or other mechanics, and consists in an arrangement for opening and closing the jaws of the vise by means of two eccentrics or cam disks placed outside of the jaws on a connecting and operating rod.

Tool for Cutting Boiler Tubes.—Richard H. Burke, New York City.—This invention relates to a tool which is intended to cut off boiler tubes inside the tube sheet, but which may also be used for cutting off the ends of such tubes. It consists of a pipe which contains a conical head provided with slots to retain the cutters, and with a feed screw in such a manner that by the action of the feed screw and conical head the cutter can be gradually fed out as the operation of cutting progresses, and boiler tubes of any desired thickness can be cut with the greatest ease and facility. The pipe, which contains the conical head and the cutters, is provided with a series of sleeves in such a manner that said pipe can be adapted to boiler tubes of different diameters.

Cooler for Coffee and Other Articles.—Jabez Burns, New York City.—This invention consists in an apparatus for cooling coffee as the same is discharged from the roaster, or other articles of a similar nature, by a downward draft produced by a suction blower or other suitable apparatus in such a manner that the smoke and dust which generally rise from the coffee or other article to be cooled, are prevented from filling the room, and all inconvenience and danger of fire arising from that source are avoided.

Roof for Railroad Cars.—John Stephenson, New York City.—This invention relates to the construction of the roofs of horse or street cars, and has for its object durability, a greater convenience than hitherto in shipping cars of this class, and a greater facility and economy in repairing the roof.

Peat Car.—Thomas J. Wells, St. Anthony, Minn.—This invention relates to a new car for transporting peat blocks or bricks from the machine or place where they are prepared to the drying house, where they remain until they become sufficiently dry for fuel. Also, in a novel construction of the car, whereby one person is enabled to load and unload the car, with the greatest facility.

Composition for Coating or Covering Ships' Bottoms.—R. Hamilton St. Helen's Place, London.—Dated April 19, 1866.—This composition is composed of fifty pounds of tallow, thirty pounds of white arsenic, and ten pounds of mercurial ointment.

Treating India Rubber—S. Bourne, Harrow, Eng.—Dated May 3, 1866.—This invention consists in heating india-rubber and india-rubber compounds in the presence of charcoal, by preference animal charcoal, whereby all unpleasant odor is removed from the india-rubber.

Compcsition for Removing and Preventing Incrustation In Steam Boilers.—G. Feasey, Camberwell, Eng.—Dated May 2, 1866.—This improved preparation or composition for removing and preventing incrustation steam boilers is composed, mainly, of carbonate of soda and co on salt, with a small quantity of borax, and sometimes sal ammoniac or hydrochlorite of ammonia mixed with soap, a small quantity being added from time time, to the water in the boiler.

Combined Corset and Skirt Supporter.—Wm. Bacheller, Boston, Mass.—This invention relates to a skirt supporter and corset combined, the said supporter being made of sheet metal or other suitable material molded to fit the form of the person wearing it, and so secured to the corset as to form a part of the same and to be susceptible of being attached and detached at pleasure when the corset is to be washed or cleansed.

Globe Valve.—C. L. Frink, Rockville, Conn.—This invention consists in forming a peculiar-shaped disk by which a person is enabled to hold the elastic packing in globe or other valves in place.

Cultivator.—C. P. Norton, Roseville, Ill.—This invention relates to the construction and arrangement of the several parts of a corn cultivator whereby an efficient and very simple machine is produced.

Life-boat.—William Henry Wylly, Savannah, Ga.—The object of this invention is to provide a life-boat which shall not only combine lightness, strength and durability with safety, but be so constructed that it can be easily transported from place to place overland or on shipboard.

Pump.—J. G. Weisinger, Danville, Ky.—This invention consists in so constructing and arranging the various parts composing the pump as to secure continuous suction and thus discharge therefrom in a continuous stream.

Fan Blower.—George W. Bright, Philadelphia, Pa.—The object of this invention is to obtain a blast by the reaction of steam or other elastic substance discharged from the wings of the blower thereby causing them to revolve with great rapidity.

Plant Tray.—Dr. William W. Smith, Montrose, Pa.—This invention consists in forming a box or tray for the propagation or growth and cultivation of plants and flowers either for outdoor or indoor use.

Gold Condenser.—William G. Redman, Louisville, Ky.—This invention consists in constructing an instrument for condensing gold in the process of filling teeth, and for preparing the cavity for filling, whereby the operation is much more perfectly performed than by the old method.

© 1867 SCIENTIFIC AMERICAN, INC.

DEVICE FOR NDING RAILROAD CAR WHEELS ON OR OFF THE TRACK.—George T. Lape and Jephthah Leathe, New York City.—This invention relates to a device to be used for guiding railroad cars on or off the track, the form being modified to adapt it to the rail either of a street horse-car railroad, or of a railroad for steam cars.

WASHING MACHINE.—Charles Daniel, Lamonte, Mo.—This invention consists principally in a slotted cylinder, adjustably pivoted to the sides of the tub or box, in combination with a slotted adjustable concave frame, pivoted to the sides of the box or tub, by means of which the clothes are held forward to be washed by the revolution of said cylinder.

FILTERING TUBULAR WELLS.—Charles C. Cole, Northfield, Vt.—This invention relates to the construction of lower sections of tubing, to be used for obtaining water cheaply and readily in clay or sandy regions without the expense and trouble of digging wells.

TETHER.—Daniel Kidder, Franklin, N. H.—The object sought to be attained by this invention is to provide a tether by the use of which it will be impossible for the rope or chain employed, and by which the animal is harnessed or connected with the tether, to become entangled with or about the limbs of such animal.

CANE STRIPPER.—Amos Bean, Canaanville, Ohio.—This invention has for its object to furnish an improved instrument by means of which cane may be stripped quickly and cleanly.

STEAMBOAT SIGNAL BELL.—Patrick Kenny, New York City.—This invention has for its object to furnish an improved apparatus, by means of which the pilot from the pilot house may readily and unmistakably communicate his directions to the engineer.

WINDOW BLIND FASTENER.—L. C. Wing, Concord, Mass., and A. R. Bradeen, Waterborough, Me.—This invention has for its object to furnish an improved means by which window blinds may be held and locked both when closed and when opened to any desired angle.

SCAFFOLD.—L. B. Carpenter, Milwaukee, Wis.—This invention has for its object to furnish an improved scaffold for masons' and bricklayers' use, by means of which they can raise themselves as their work advances to any desired height, without its being necessary for them to unload the scaffold and build it higher.

PUMP.—John Ross, Greenville, Mich.—This invention has for its object to furnish an improved pump, by means of which water can be raised from deep wells quicker and easier than with the pumps now in use.

OPENING AND CLEANING COTTON, ETC.—Samuel Fay, Lowell, Mass.—This invention is designed to furnish an improved machine for opening and cleaning cotton and other fibrous substances in a thorough manner, without injuring the fiber or rolling or curling it, as is the case when opened by ordinary means.

COTTON CHOPPER AND THINNER.—David P. Lewis, Huntsville, Ala.—This invention relates more particularly to the cultivation of cotton, but is adapted to other crops, and it consists in operating a double-bladed hoe by machinery.

COVERING COT OR ROLLS.—Edward Livingston Perry, New York City.—This invention consists in forming a cot or covering for the rolls of spinning and other machines, of three or more separate layers or thicknesses of material, secured or united together, by means of cement, glue, or other suitable adhesive material, or in any other proper manner, either independent of the roll on which the cot is to be used, or directly upon the same.

CUTTING FILES.—Charles Vogel, New York City.—This invention consist-in an improved arrangement of mechanism for feeding the file bloks to the cutter, whereby the speed of the file may be varied according to the size of tooth required. Also, in an inproved file-bed, so constructed that files of varying sizes can be secured to it; and also, in a novel manner of hanging the cutting-tool, whereby it can be adjusted to suit the desired direction or angle of inclination of tooth with reference to the length of the file block.

BROOM.—Hy. E. Newton, Manchester, N. H.—This invention consists in attaching one or more springs to the broom head, and securing their upper ends to the handle, in such a manner that they form the connection between the handle and the broom head.

PLOW.—Israel Long, Terre Haute, Ind.—In this implement, which is a wheel or sulky plowing machine, a plow is attached to either end of the axle outside of the wheels by means of adjustable arms or beams, one plowbeing raised out of contact with the ground while the other is in operation. The working plow stands in close proximity to the wheel on that side of the machine, and prevents clogging by uprooting and deflecting the weeds, stones, etc.

MILL GOVERNOR.—William Bahme, New Media, Pa.—This device is intended to close the water gate and stop the water wheel when a certain speed is attained. When the grain ceases to feed between the mill stones the rapid revolution of the runner frequently fires the woodwork. To avoid this a revolving governor ball is pivoted by an arm to the mill shaft, so as by the rise due to a high rate of speed to strike a plate and release the water gate which controls the admission of water to the wheel.

GANG PLOW.—J. H. Doutbit, Albany, Oregon.—This invention relates to a gang plow, and consists in a novel construction and arrangement of parts, whereby the operator has full or perfect control over the plows.

CAMP COFFEE POT AND BOILER.—Luke Plumb, Biddeford, Maine.—This invention relates to the combination of a camp tea or coffee pot and boiler, or pitcher, whereby an ordinary coal-oil lamp may be rendered serviceable as a heater for cooking in a small way; such, for instance, as the making of coffee and tea, warming water, and keeping a meal warm during the delay or temporary absence of a person from the table.

SEED PLANTING MACHINE.—D. S. Holman, Conneautville, Pa.—This invention relates to a machine for planting seed, and it consists in a novel seed dropping device, with means for regulating the discharge of the seed, and also in an improved means for opening the furrows and covering the seed after being dropped therein.

HOOP-SKIRT HOLDER.—EmileLoiseau, New York City.—This invention consists in arranging a device whereby the lower or any one hoop of the skirt is secured to the petticoat, thereby making actually one garment out of the two.

COMBUSTIBLE AND INEXTINGUISHABLE COMPOUND.—J. Sharp and R. Smith, Blackford, Perthshire.—This invention relates to the combination or mixture of certain materials for the production of a combustible compound which, when once ignited, becomes inextinguishable by any agent at present known, as it burns without atmospheric air, and will burn in water, in carbonic acid gas, nitrogen, and all other gases which do not support combustion. Under one modification the compound may be formed by mixing nitre, charcoal, and sulphur, all in a powdered state, and then adding and thoroughly commingling therewith a quantity of unground or unpowdered gunpowder. The proportions are four parts nitre, two parts charcoal, and one part sulphur, with the addition of two parts gunpowder.

PULLING FLAX.—John Harrington, Minomonie, Wis.—This invention relates to a machine for pulling standing flax for the purpose of harvesting the same, and it consists in the employment or use of a reel provided with clamps and arranged in such a manner that it will rotate as the machine is drawn along and grasp the flax, draw it out of the earth and deposit it upon the platform.

CAR TRUCK.—J. W. Reynolds, Hyde Park, Pa.—This invention relates to a mode of attaching or applying the pivot or king-bolt to the truck, whereby said bolt may be readily applied to and detached from the truck and a new one applied at any time, when necessary, with the greatest facility. This invention also relates to a novel manner of applying the springs to the truck, and in an improved arrangement of the boxes.

APPARATUS FOR HEATING HOUSES AND APARTMENTS.—G. Davies, London.—The object of this invention is to utilize all the heat eliminated from the flame of gas, or that of any of the oils or fluids possessing illuminating properties, by causing such flame to pass over or come in contact with a system of heat-radiating materials, so arranged as to absorb, conduct, and radiate the heat imparted to the said radiating material from the burning gases or fluids. The smoke or vitiated air from the burning gases or fluids are conducted off in a separate pipe to the chimney or other place of exit, and pure heated air is conducted into the apartment when a heating apparatus is used, or radiated within the various compartments of a cooking stove or range when the latter used.

DRAWING OR PROPELLING BOATS, BARGES, RAFTS, AND OTHER SIMILAR STRUCTURES, ON CANALS, RIVERS, ETC.—C. E. Brooman, London.—This invention consists in constructing a continuous rail or bar, or its equivalent, along the side of the canal or navigable water, which rail or bar is grasped by traction or friction wheels operated by steam or other power in the boat to be removed. It is attached by any convenient means to upright posts firmly fixed and ranging along the direction of the canal.

SAFETY RECORD PAPER.—L. M. Crane, Ballston, N. Y.—This invention relates to a safety record paper for bills, deeds, currency bonds and other instruments or documents which are liable to be forged or fraudulently altered. This invention consists in inserting in the paper pulp and incorporating with it, during the process of manufacturing the paper, one or more threads or strips of guttapercha or other material which will soften under the heat of the drying cylinders of the paper-making machine, and become inseparably united with the paper so as to be incapable of being removed or detached without destroying the latter.

Answers to Correspondents.

CORRESPONDENTS who expect to receive answers to their letters, must, in all cases, sign their names. We have a right to know those who seek information from us: besides, as sometimes happens, we may prefer to address the correspondent by mail.

SPECIAL NOTE.—This column is designed for the general interest and instruction of our readers, not for gratuitous replies to questions of a purely business or personal nature. We will publish such inquiries, however, when paid for as advertisements at 50 cents a line, under the head of "Business and Personal."

R. L. B., of Mass.—The alloys of magnesium reported on at the present time are all brittle, and are generally more easily oxydized than magnesium alone. But we hope you will continua your experiments, and let us hear from you when you shall have produced a useful alloy.

J. C. M. & Co., of Pa.—The oxygen of the air can readily be removed by phosphorus. But in that way you dispose of only one-fifth of the whole. There is no substance that will take up the nitrogen. We think therefore you will not be able to secure a good vacuum on the absorption plan.

H. S. C., of Pa.—The coloring matter of clay is generally iron or organic matter. On baking clay, the organic matter is burned up, and if the clay contained no iron or other metal, the ware will be white. The iron may be removed by soaking the clay in hydrochloric acid. The ordinary blue clay gets most of its color from organic matter. The red color of bricks is due to an oxide of iron.

W. E. B., of Pa.—You will find in the text books on chemistry reliable tables of the expansion of metals by heat. Of the metals you name, zinc expands the most.

J. C., of Tenn., quotes from Hooper's Medical Dictionary, article Caloric, some contradictory statements regarding the density of melted and solid iron. When the doctors seem so disinclined to agree on matters touching their own art, it is not surprising that they should be inconsistent on outside matters.

C. A. G., of N. Y.—The tarnish on silver ware is most often due to sulphur. A gentleman, who wears a silver watch finds that it is tarnished from the sulphur fumes of the rubber ring which holds together his ferry tickets. Sulphur fumes enough get into the air to account for all ordinary cases of tarnishing. The sulphide of silver is black.

G D. C., of Conn.—Wheels of lead, or rather a mixture of lead and tin, will carry flour of emery or crocus and will not deface the corners of an object and will give a perfect polish.

J H. P., of Mass.—There is necessarily nothing in the matter on postage or other Government stamps, or on envelopes, to induce sores on the lips. When they occur, as in the case of preparing replies to numerous correspondents, the soreness is to be attributed to the friction on tongue and lips which is much increased by the adhering quality of the dextrine.

T. H. K., of N. Y.—You say that attached to your water wheel is a four-feet bevel gear, driving a sixteen-inch bevel gear, on a shaft carrying a thirty-six inch driving pulley with fifteen-inch belt, and ask whether more power can be obtained by the use of larger gears. Judging from the size of the belt used to transmit your power we think your gears are full small. Really no more power is developed by large than by small gears, but as bevel gears are at best but mechanical makeshifts, absorbing power, we think the nearer the two wheels approach in size the better they work. Better use bevel gears of equal size and speed upon your pulleys. This statement is a reply to both your questions.

H. B. L., of Ind.—A boiler begins to make steam as soon as the water begins to heat, and makes steam as long as the heat is applied, under all circumstances. The steam pressure in a boiler to the square inch is as great in the water space as in the steam space with the addition of he weight of water. Water does not, in our belief, present a barrier or wall to the pressure of steam. You are mistaken in saying that steam will not go down through water. Steam exists in water, and if you will carefully study "Heat and Steam by Charles Wye Williams," H. C. Baird, Publisher, 406 Walnut street, Philadelphia, you will probably modify your present opinions.

H. N. G., of Pa.—Turning tools for iron will cut better if ground on the side of the stone running toward you Never grind a tool the temper and edge of which you wish to preserve, on a dry stone. It is a certain and effectual method of drawing the temper of hardened steel.

R. O. N., of Mich.—A large part of the saltpeter (nitrate of potash) now used is an artificial product. Gun powder makers at first had a prejudice against saltpeter made from nitrate of soda, but there is no way of distinguishing the artificial from the natural product.

S. N. M., of Va.—Magnesia is an essential element in hydraulic cements. Any magnesian limestone, will give on burning, hydraulic lime.

R. D., of N. H.—Coal is found in several localities in New England, and has been mined in Rhode Island. But there is not enough coal in New England to affect the fuel question.

S. N., of Wis.—Copper is smelted on a tolerably large scale in this vicinity. The largest copper smelting works however, are located in Baltimore.

P. B., of O.—The reason that pickles, apple sauce etc. made in an iron kettle look dirty and black, is that some of the iron is dissolved by the acid, and this with a little tannin contained in the fruit, produces a black substance which is the same as ordinary ink. Acid fruits should be cooked in a porcelain lined kettle.

B. B. R., of Mo.—Lithographic stone is worth about 50 cents per lb. If you send your sample to any practical lithographer he can give you a reliable opinion of its value. But be prepared to find out that you have been mistaken, and that your article is not the genuine thing.

N. S. of Cal.—The best solvent of gold is aqua regia (nitric acid 1 part, hydrochloric acid 3 parts). There are also many other solvents.

S. L., of N. Y.—The expansion by heat is generally understood by gas and steam fitters. You should observe that steam pipes for warming buildings are arranged so that no harm can come from the expansion.

M. B., of Del.—Leather is chemically a compound of gelatine and tannin. Your article, which you say contains no gelatine, is not leather, We trust, however, you have something better than leather. . . . . You say that whenever you hear a fiddle you think of poor pussy cat. But you are misplacing your sympathy. Sheep and calves furnish us with catgut.

B. R., of Pa.—The fact that stretched rubber on contracting becomes cold is not new. You will find it mentioned in Grove's Correlation of the Physical Forces.

R. V., of Ind.—Sorgho sugar cannot be distinguished from ordinary sugar when thoroughly purified.

B. F. C., of Pa.—The question asked is this: If a cylindrical boiler of 3 feet diameter and 18 feet long has an extension attached, the inside dimensions of which are 18 inches long, 6 wide, and 1-64 high will the pressure to the square inch of surface to this contracted appendage equal that to the square inch on the boiler? We answer: The pressure will be the same, whatever the form and dimensions of the vessel, the only difficulty being to preserve the same temperature in the thin projection from the boiler as in the boiler itself. A thin film of steam at any noted pressure will exert the same force as a thicker stratum of one or more inches in depth.

G. W. J., of R. I.—There is no necessity of cutting large holes through your floors, or of cutting holes at random to lead belts from a shaft on one floor to one on another. The mechanic who resorts to such means is a bungler. The whole plan can be laid out full size on an unoccupied floor, or by a scale on a sheet of paper or a board. As an instance, if you wish to lead a belt through two floors, measure the distance of the center of the shaft carrying the driver from the first floor, taking the diameter of the pulley. Draw a line on the floor, sheet, or board representing the floor, and giving its thickness, with the diameter and position of the pulley. Then measure from the upper surface of the first floor to the ceil-of the next, making another line; then from the next floor or top of the ceiling—allowing for thickness between them—to center of driven shaft, giving the diameter of driven pulley. Draw lines from periphery of driver to driven, and where these intersect the floor lines, are the passages to be cut.

J. R. M., of Ohio.—You need have no fears on the point you suggest. We shall publish all that we think will afford interest and instruction to our readers. The society to which you referred, needed a strong hint. It will do the members no harm.

Sundry Answers:—E. K. C.—Mercury and oil are good examples.——J. B. C.—The royalty paid to the owner of a patent is always a subject of negotiation. The patentee has the right to fix the price so high that it amounts to a prohibition if he chooses. But we never heard of one who was such a fool as to do that. It is a matter of interest as well as of pride with a patentee, to have his invention used as extensively as possible. ——C. H. M.—The best way is to advertise for an agent.——E. N.—In the back pages of the SCIENTIFIC AMERICAN, you will find information about dummy engines.——J. M. C.—Your perpetual motion will prove to be a perpetual stand-still.——C. A. S.—The screw jack simply enables a man to apply his strength to good advantage, but it does not increase his strength It is impossible for you to obtain any more power from your screw arrangement than you apply. Your perpetual motion is also a no-go.——R. H. S.—You would get a partial vacuum in the way you describe, but it is a roundabout way to do it. The part by which you obtain the vacuum namely, the air piston and cylinder, are shown in all natural philosophies.——C. R. S.—Cannot find the address without search.

Business and Personal.

The charge for insertion under this head is 50 cents a line.

J. C. Haines, whose Patent Bridle was illustrated in No. 3, present Vol., wishes parties to address him hereafter at Lancaster, Pa., instead of Lewistown.

Reiner Brothers, Line Lexington, Pa., want manufacturers of cultivator hoes, also of tub and bucket machinery, to forward their address and price list

To Agricultural Implement Makers.—Send catalogues to W. A. O. D., Box 6810, Post-office, New York.

Wanted, a situation as foreman and superintendent of an Agriculture Tool and Machine Factory, by a first-class mechanic who has experience and good references. Address E. Peek, Chicago, Ill.

Watchmakers wishing cuts and circulars of Lakin's Lathe Tool will please address J. A. Lakin, Thompsonville, Conn.

C. G. Van Pappelendam, Charleston, Lee County, Iowa, wants a shop right to manufacture molasses out of corn.

NEW PUBLICATIONS.

The progress of the beautiful art of photography in this country, is indicated to some extent by the variety of books and other publications pertaining to the subject, which find a ready and extensive sale. From the publishing house of J. H. Ladd, 600 Broadway, we have lately received the following:

HUMPHREY'S JOURNAL FOR 1866. Semi-monthly, at $3 a year.

A fine volume of 400 pages, brim full of the latest and best things concerning photography that have been recorded during the past year. The journal is highly valued for the many original contributions by its experienced editor and home correspondents, and for its foreign reports.

THE SILVER SUNBEAM. 440 pages. Price $2 50.

This is a text book of photography, and has had a very extensive sale. It contains full explanations of almost every known photographic process, from the simplest to the most complicated, hot or cold, wet or dry. It has the rare merit of practical correctness in its directions, as probably all of its formulas and processes have been actually tested by the author, Professor Towler. The book presents the science of optics as applied to lenses, the history and progress of photography, complete directions as to preparation of photographic chemicals, collodions, developers, fixing agents, intensifiers, negatives, positives, ambrotypes, tintypes, silver printing, carbon printing, porcelain pictures, photographs on leather and cloth, transferring, relief printing, stereoscopes, engraving, Wothlytypes, eburneum process, how to glaze photographs, duplex pictures, irontype, etc., etc. All who desire to be fully posted in respect to photography should possess this work.

THE PHOTOGRAPHER'S GUIDE. Price $1 50. 150 pages.

This is a recent work from the pen of Prof. Towler, containing concise and brief instructions for conducting all the most approved forms of photographic operations, both in the gallery and in the field. Nothing can be more straight forward and plain than the directions here given. Solar printing, vignetting, saving of residues, opal pictures, and every branch of the photographic art, are admirably explained.

AMERICAN PHOTOGRAPHIC ALMANAC FOR 1867. Edited by Prof. Towler. 102 pages. 50 cents.

A record of the most valuable improvements, processes and formulas made during the past year. The almanacs for 1865, 1866, and 1867, are all in print.

THE MAGIC PHOTOGRAPH, 25 cents, the PORCELAIN PICTURE, with full instructions, $1 00, and DRY PLATE PHOTOGRAPHY, OR THE TANNIN PROCESS, $1 00, all by Prof. Towlor, are highly useful.

Inventions Patented in England by Americans.

[Condensed from the "Journal of the Commissioners of Patents."]

PROVISIONAL PROTECTION FOR SIX MONTHS.

3,203.—PROCESS AND FURNACE OR APPARATUS FOR THE MANUFACTURE OF STEEL OR METAL HAVING SOME OF THE PROPERTIES OF STEEL.—Thomas J. Chubb, Brooklyn, N. Y. Dec. 5, 1866.

3,205.—APPARATUS FOR SEPARATING SUBSTANCES OF DIFFERENT SPECIFIC GRAVITIES.—Thomas J. Chubb, Brooklyn, N. Y. Dec. 5, 1866.

3,217.—LOOMS AND SHUTTLES FOR WEAVING.—Benjamin Oldfield and Edward Oldfield, Newark, N. J. Dec. 6, 1866.

3,246.—SEWING MACHINERY.—Frank Armstrong, Waterbury, Conn. Dec. 8, 1866.

3,253.—BREECH-LOADING FIRE-ARM AND CARTRIDGES AND BULLETS FOR THE SAME.—Hiram Berden, New York City. Dec. 10, 1866.

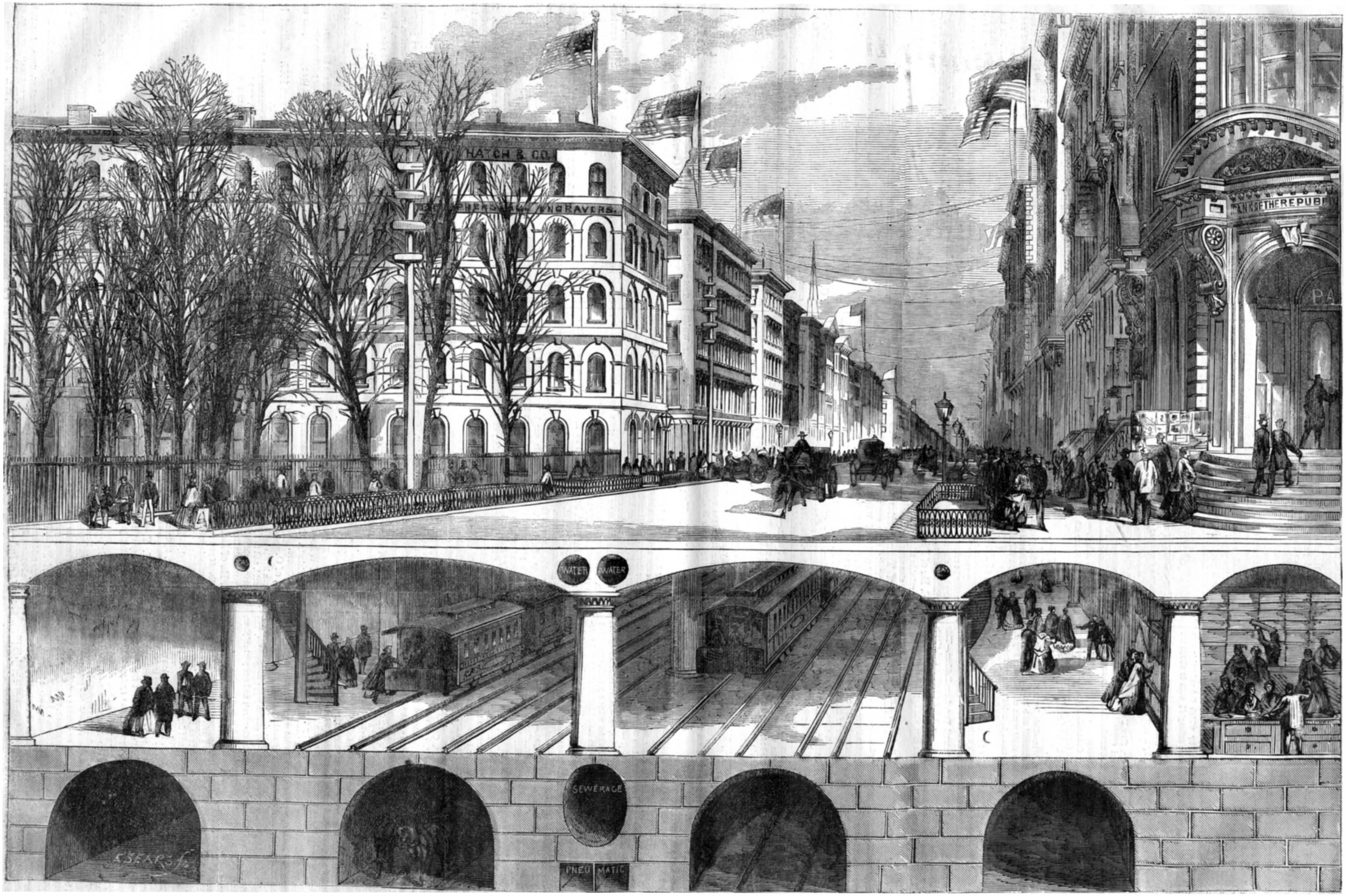
4,256.—RAILWAY CARRIAGE AND WAGON.—Samuel Maynard, New York City. Dec. 11, 1866.

3,282.—SCRUBBING MACHINE.—Andrew Irion, Femme Osage, Mo. Dec. 13, 1866.

3,430.—NAUTICAL LOG.—Truman Hotchkiss, Stratford, Conn. Dec. 29, 1866

3,452.—METHOD OF EFFECTING THE CUTTING-OFF IN STEAM ENGINES, ALSO THE REGULATOR FOR CONTROLLING THE SPEED OF STEAM ENGINES.—Geo. H. Babcock and Stephen Wilcox, Jr., Providence, R. I. Dec. 31, 1866.

© 1867 SCIENTIFIC AMERICAN, INC.



THE PROPOSED ARCADE RAILWAY AND AVENUE UNDER BROADWAY. DESIGNED BY S. B. B. NOWLAN, C. E.—[See next page.]

© 1867 SCIENTIFIC AMERICAN, INC.

SCIENTIFIC AMERICAN.

MUNN & COMPANY, Editors and Proprietors.

PUBLISHED WEEKLY AT
NO. 37 PARK ROW (PARK BUILDING), NEW YORK.

O. D. MUNN, S. H. WALES, A. E. BEACH.

☞ "The American News Company," Agents, 121 Nassau street, New York.

☞ Messrs. Sampson Low, Son & Co., Booksellers, 47 Ludgate Hill, London England, are the Agents to receive European subscriptions or advertisements for the SCIENTIFIC AMERICAN. Orders sent on them will be promptly attended to.

☞ Messrs. Trubner & Co., 60 Paternoster Row, London, are also Agents for the SCIENTIFIC AMERICAN.

VOL. XVI., No. 6....[NEW SERIES.] ....*Twenty-first Year.*

NEW YORK, SATURDAY, FEBRUARY 9, 1867.

Contents:

(Illustrated articles are marked with an asterisk,)

*Improved Windmill	85	They Eat	90
*Improved Lathe Arbor Tightener	85	Why Water Presses Sideways and Upwards	90
The "Miantonomoh."	85	Machines Mediums and Not Reservoirs of Power	90
Silver Mining in the Great Basin	86	Steel-Headed Rails	90
Water Supply of Towns	86	Recent American and Foreign Patents	90
How Shall We Burn Coal Most Economically?	86	Answers to Correspondents	91
Varying Ideas of Model Makers	87	Business and Personal	91
Editorial Summary	87	New Publications	91
*Improved Metallic Cotton-bale Fastener	88	Inventions Patented in England by Americans	91
The Composition of Alloyed Metals	88	*Proposed Arcade Railway and Avenue under Broadway	92
Scientific Snow Storm	88	Having an Object and Sticking to It	93
Government Tests for Iron	88	Crossing the Water—Ferries, Tunnels, and Bridges	93
*Sill's Stamp Affixer	88	The Arcade Railway	93
*Batcheller's Hand Planter	88	The Recoil of Guns—Action and Reaction Not Equal	94
A New Anchor	88	Proving a Great Gun	94
*Carbonizing Wood and Blasting Rock with Fire	89	Patent Claims	94, 95, 96, 97
New Movement for Locomotive Throttles	89	Advertisements	98, 99, 100
Wind Mills in New York City	89	*Improved Differential Movement	100
*Converse's Improvement in Pocket Fire-Arms	89	Device for Elevating Liquids	100
Chunks of Gold	89	How to Obtain Patents	100
Snow in Cities	89	Prospectus	100
Cost of a Newspaper	89		
Earth Worms—How and What	89		

HAVING AN OBJECT AND STICKING TO IT.

Persistence in any chosen vocation is an essential to success. This is a general rule, but we desire now only to apply it to the business of the mechanic. Constant practice, constant study, and constant application are conditions precedent to perfection. But even these will be wasted if the occupation chosen is unfitted to the natural qualifications of the workman. Some are born without any natural aptness for the mechanical arts. Every mechanic understands what is meant by a "mechanical eye." The want in the visual organs thus characterized does not necessarily imply that there is a disease or malformation of the optic nerve, but rather that there is no judgment to direct and guide the eye. The infant grasps as readily at the moon as at his rattle within a few inches of his face. In time, by repeated experiments, he learns the relative distances and dimensions of objects. All are capable of this amount of judgment, but in the practice of mechanics a much higher degree of experience is required and a much closer exercise of the judgment. There are some men who may practice at a mechanical trade their whole life long and never be even passable workmen. They never can tell whether a line is straight, or a surface level, even with the aid of levels and straight-edges. We remember an instance in point, where a young man ardently desirous of becoming a machinist was compelled to forego his favorite business because of this imperfection—the want of a "mechanical eye." His first job was the centering of some pieces of round iron, seven inches long and one and one-eighth inches diameter. He worked with vice, hammer, center punch, and bench centers half a day on twelve pieces, yet he did not correctly center a single one, although he received repeated instructions and examples from the foreman. Indeed he could not, even with the aid of chalk held against the revolving surfaces of the cylinders, see in what respect they were not true. Such an apprentice could never become a workman and his failure would result from no fault capable of remedy. Many employers have had a similar experience with their apprentices, or with those who called themselves workmen. The first requisite, therefore, is to have a proper object, one fitted to the capabilities.

Another of more importance is to stick to it. We take it for granted that every beginner at a mechanical business enters it with the intention and purpose of becoming a first class workman. If not it is more than probable he will never reach even mediocrity. If he is satisfied to serve his time, blundering through his work without understanding it, he will come out one of those nuisances to employers and disgracers to workmen, a "poor tool." Such professional workmen cannot stay long in any situation and are compelled to accept the most distasteful work with the lowest wages. Even under these circumstances there might be hope for them if they would, thus late, endeavor to stick to their business; but, being disheartened, they drift about "from pillar to post," trying this and attempting that, and succeeding in nothing because they will not thoroughly, and honestly, and persistently apply themselves to their business.

Soon apprentices think that when they have achieved the triumph of doing one job in a single department of their business their trade is learned and their position secure. They do not seem to realize that although the customary or legal term of their novitiate has expired they are still learners. New methods of doing work, new tools, new descriptions of work, new combinations of materials are continually being brought forward, and the mechanic who has attained the position of a first class workman by patient practice, must preserve and hold that position by constant endeavor.

There are others who "stick to it" in a different way. These are they who having spent a limited time in a shop assume to know all they have ever had to do and also all they have seen others do. They have done with learning. In their own estimation they are perfect. When seeking a job they assume a thorough knowledge of the work to be performed and the method of doing it. These men soon find their level. We knew once of such a prodigy who hired into a machine shop and had for his first job the turning of connecting bars tapering from center to ends. He asked a fellow workman how he should turn them. The answer was: "Set the tail of your lathe over," meaning to move transversely the upper portion of the tail-stock to the proper angle. He understood it literally and procuring a crow-bar was swinging the lathe frame out of line with the driving shaft when the foreman discovered him. His services were incontinently dispensed with.

Mechanical art does not need such helpers. It needs men with a purpose; men who are willing and ardent to learn; men who are not dismayed at obstacles, but who take a pride in either removing or overcoming them. Only such will ever become mechanics worthy the name. The others are abortions.

CROSSING THE WATER---FERRIES, TUNNELS, AND BRIDGES.

Those who are compelled to use the ferries running from Manhattan to Long Island and to the Jersey shore have been severely tried in temper during a portion of last month. Immense fields of fixed ice, or floating floes driven by keen cutting gales, have interrupted the only mode of transit between the metropolis and Brooklyn, Williamsburgh, Jersey City, Hoboken, and Staten Island, and crowds of anxious and disappointed people in all these places have been put to great inconvenience and expense. It would be a blessing not only to the dwellers in all these localities, but to the transient traveling public and the people of the whole country if some permanent remedy and preventive could be adopted and applied; for whatever delays the ordinary routine of business in this, the commercial heart of the country, must be felt in its effects, to a greater or less degree, throughout the land.

It may not be expected that human ingenuity and foresight can in all cases neutralize the opposition of the elements to the means of transportation; but in this case it would seem that there are several remedies, either one of which, or at least all combined, might bid defiance to wind, water, and frost. The boats used in fair summer weather might be so modified in construction as to be fitted for battling with the ice withou impairing their convenience as comfortable vehicles for passengers. Or one, two, or more ice boats, intended for forcing their way through icy obstructions, might be provided to keep the paths of the different ferries open, and be employed in summer as powerful tugs, so that they would, during the fair-weather season, earn enough to at least partially pay for their needed pioneer winter service.

But there is a radical remedy better than either of these. That is to make a permanent crossing between New York and the suburbs on either side by means of tunnels, bridges, or both. There are no obstacles impossible to be surmounted in either of these. Tunnels may be drifted through the strata which form the beds of the rivers, or made of iron in sections, sunk and secured together to make continuous tubes. Tunnels of this latter class may be built of such weight and strength that even the anchors of vessels dragging in a gale would have no more effect on them than on the immovable rocks; but legal precautions could be taken to prevent such accidents.

There does not appear to be any insuperable impediments to the throwing of bridges across from one shore to the other on both sides of the city. The lowness of the shores on the New York margins, both sides, and on the North River Jersey shore, could be compensated for by extending the bridge on open causeways up some distance from the water's edge, landing passengers and teams in the heart of the cities; on the Brooklyn shore the Hights offer an excellent starting point, and from the termini of these bridges might radiate in every direction lines of horse railroads or other means of conveyance to whatever point to be reached. These bridges should be suspended at an elevation sufficient to allow the passage of shipping under them at all states of the tide. Probably a pneumatic tube across the East River will be *un fait accompli* ere long, but valuable as it might, and probably would be for the transmission of freight in parcels, it would be some time before it would become a favorite and popular route for passengers. People prefer to see unavoidable and certain dangers rather than to dread in darkness unknown perils, and the public demand would, we think, be better met by elevated bridges or well-managed ferries than by pneumatic or other tunnels.

But all these methods appear to be feasible. In the advanced stage of engineering science to which we have arrived it is puerile to denounce any such project on account of imaginary or estimated difficulties or the cost of the work. While English and French engineers are seriously considering and estimating upon the project of uniting their two countries by a tunnel of over twenty miles, under one of the stormiest seas on the globe, we ought not to shrink from so comparatively trifling a job as tunneling the narrow strips of inland water which separate us from almost contiguous shores. As to bridges, we have the example of the Menai Straits bridge, the Victoria, the Niagara, and lately the Cincinnati and Covington and the Havre de Grace structures. "What man has done man may do," and where the necessity is so apparent it is not creditable either to our enterprise, public spirit, or our mechanical progress that the people of the metropolis and of the whole country should be satisfied with such insufficient means of intercommunication as those which now so inadequately accommodate them.

THE ARCADE RAILWAY.

Upon the opposite page we present an illustration of the great Arcade Railway which is now proposed for immediate construction under Broadway, by H. C. Gardner, Esq., and Hon. Melville C. Smith, from designs by S. B. B. Nowlan, C. E.

This is probably the most thoroughly comprehensive and excellent of any of the various plans that have been suggested, for while it provides the most abundant means for rapid passenger transit and relief of the streets, it does not block up any part of the city, but, on the contrary, adds enormously to the available street space. In short this plan contemplates nothing less than the addition to the city of an immense avenue, which is to traverse the heart of the metropolis, increasing its wonderful attractions, augmenting the value of its property, and giving to the people the great boon of sure, rapid and cheap communication.

We think there are few persons whe will not be at once favorably impressed with the practical excellence of this plan. The principal objection to be raised will be its apparently enormous expense. But the cost will be comparatively nothing compared with the immense public advantages that would result from its successful construction, and we trust that the enterprising men who have charge of the matter will receive all possible encouragement. It is estimated that the expense will not exceed $2,000,000 per mile. The cost of the London tunnel railway now in profitable operation is stated to have been $5,500,000 per mile, the greater portion of which must have been paid for the purchase of the right of way.

Our view is taken from near the corner of Wall street looking up Broadway. The plan, as seen, is not merely to tunnel under the street, but to remove the street itself, block by block, from wall to wall, and construct another street at the depth of fifteen feet, supporting the present street level on arches, and making stores in what are now the basements and sub-basements of buildings. Below all are the sewers, with tunnels for the passage of carts which reremove the offal, etc., that naturally finds its way to the lowest level. This lower portion is to be of the best masonry, strengthening the foundation walls of the buildings and giving ample support to the superstructure. Light—daylight—is afforded the sub-street or arcade by areas inclosed with iron railings between the upper roadway and sidewalk, ample room for which will be found when the upper street will be relieved by the construction of the lower. At convenient intervals flights of steps will lead from these areas to the street below, and the pedestrians as well as those who ride in the cars, will be sheltered from the storms of winter and the suns of summer.

This is a general idea of the plan. Those who have the matter in hand have omitted, apparently, no detail to insure entire success should the plan be adopted. We will mention a few of the most important.

To use the streets from the Battery along Broadway to Ninth avenue, thence to 150th street, thence to a junction with the Hudson River Railroad near Fort Washington. Also a branch beginning on Broadway below City Hall Park and running along Park Row, Chatham street and the Bowery to Third avenue, thence along that avenue to the Harlem River, thence along the river to a point intersecting the Harlem Railroad. The main road and branch to have at least four tracks with room for constructing additional tramways. The streets to be excavated their entire width to a depth of twenty-five feet, the lower ten feet to be occupied by sewers and vaults. Under the buildings exposed by this excavation a range of basement stores to be constructed by the company without cost to the adjoining proprietors and finished in the same or a corresponding style with those above. Walks to be laid as now on the streets above. The railroad to be covered by a roof supported on iron colonnades between walk and track and between the two roadways, covered with heavy plank filled in with concrete, supporting a water-tight iron pavement, constituting the upper roadway. Ample precautions for the support of the buildings and arrangements for conveying the sewage, gas, and water, to be provided by the company.

The method of construction proposed is that the street to be excavated will be taken up one half side of a block or square at a time, so as not to interrupt travel more than in the erection of any new building, the supply of gas, water, and the convenience of sewerage to be kept up during the progress of the work. The cars on the outside tracks in this lower street are to be run at the rate of about five miles per hour, and intended for way passengers. Those on the inside tracks to run at fifteen miles an hour, to stop only at stated points, all to be drawn by locomotives emitting neither smoke nor sparks.

The necessity of some thorough and permanent relief to our over crowded streets is too apparent to require argument. The advantages of this plan are readily seen from the foregoing remarks. Freight and passengers will be largely diverted from the present routes, both being sheltered from the elements, whether storm or shine. The upper roadway will be kept in more passable condition in respect to snow and ice by the latent heat from the immense mass of iron used in the building of the arcade. Property owners on the streets will be gainers by an addition to their rentable property, and the sub-roadway will become a favorite means of transit in stormy weather and as a shelter from torrid suns.

Better facilities than now exist will be afforded for the repair of our gas, water, and sewerage pipes, and it will be an attraction to out of town visitors second only to that of the great Central Park.

© 1867 SCIENTIFIC AMERICAN, INC.

THE RECOIL OF GUNS---ACTION AND REACTION NOT EQUAL.

BY PROFESSOR CHARLES A. SEELY.

In my days of gunning, long time ago, one of the mysteries among the boys was the recoil of our guns. We had theories and superstitions about it which are not worth repeating. But out of my experience I have brought a very distinct remembrance that the "kicking" was something that we were afraid of and that there was a great difference in the vicious propensities of our guns. It must be borne in mind that the shoulder of a boy is tender, and cannot easily bear a blow which a stout man might not notice. The kicking power seemed to us one of the most noteworthy properties of guns. There was a gun which was famous all over the county as a great kicker: it was said it could kick us into the "middle of next week," a distance we thought to be very considerable.

During the progress of the rebellion, when every one was a strategist and a critic on the art of war, I assisted in many discussions on the philosophy of the recoil of guns. I found that no one lacked experience or an opinion. But the opinions were generally incorrect, and those which were right were not fortified by good reasons. So I think a renewal of the discussion may be interesting and profitable.

The expansive force of burning gunpowder is the source and the only source of the movement of the shot and the gun. The force of the powder is expended upon and divided between the shot and the gun, and for my present purpose it may be considered that the force of the powder equals the force of the shot plus the force of the recoil. So far all are agreed: there is no difference of opinion. The debatable question is this: What is the relation of the force of the shot to the force of the recoil; are they equal, and if nay, why not? To put the case in its simplest terms: the shot and the gun are two unequal weights acted on at the same time and for the same length of time by an elastic substance pushing them apart.

People generally think that the powder force is equally divided between the shot and the gun, and that the relative weights of the shot and the gun are not to be taken into account. They found their opinion upon a supposed law of motion, that action and reaction are equal, and upon a supposition that the pressure upon the gun is the same as upon the shot. Now as to the law of motion, it is either misunderstood or it is absolutely unfounded. If action implies motion and force, a simultaneous and equal reaction to my mind is inconceivable. If there be a motion, any obstruction or reaction to it, as long as the motion continues, surely cannot be equal to the impelling force. If my neighbor push me down, his action is greater than my simultaneous reaction: I may get up and get even with him, but then there comes into the case a new action and reaction. It may be that all motions will finally cease by reason of reactions, but when the rest takes place, it is hardly proper to say that there is still action and reaction. Is not the alleged law of motion a very imperfect way of expressing a self-evident fact about rest or equilibrium? It certainly is not easy to see how the little truth it embodies has any application to the question of the recoil of guns. The fact is that people who quote this law generally misapply it.

The pressure on the shot and the gun may be considered as equal (if there is any difference it is greater on the gun), and the expansive force acts an equal time on each. But those who infer an equal division of the force, overlook a very essential element in their calculation. The shot moves faster than the gun and the force acts on the ball through a much greater space. Is not the space through which a force acts something to be as carefully considered as the time?

Take two balls of equal weight and place a spring between them which will impel them apart. In this case the force of the spring is conveyed to the balls and is equally divided between them: one moves as far and with as much force as the other. Now place one end of the spring against an immovable abutment, and allow it to expand against a single ball. Here the pressure on the ball and the abutment are equal, but the spring expands to its full length and gives its whole force to the ball: there is nothing lost on the abutment. The force imparted to the ball is precisely twice that which it received in the first experiment. Repeat the first experiment with balls of different weights. For example, let one have double the weight of the other. The force will now be divided so that the light ball will receive twice as much as the heavy. From such experiments the conclusion will soon be reached, that the force of the spring will be divided between the balls in a ratio inversely as their weights: if the weights of the balls be as 1 to 10, they will receive the force in the ratio 10 to 1. If a well-made spiral spring be employed, it may be observed in each experiment that there is a neutral point which does not move at all and that it is the center of gravity of the two combined balls. Thus when two balls of equal weights and sizes are used, it will be in the middle of the spring: in the second experiment it will be in contact with the abutment: in the case of the balls of weights 1 to 2, it will be two thirds the distance between the balls from the ball, 1. Thus this point indicates the division line between the amounts of force going to the balls respectively.

Such experiments may be varied by using a contracting instead of an expanding force. Take two toy wagons, connected by a rubber cord, and use weights of any convenient material. Or the weights may be suspended by cords, to be drawn together by the contraction of a rubber spring. The result will always be arrived at that the forces will be divided inversely as the weights. Moreover it should be observed that the velocities communicated to the balls are inversely as their weights. In the case of the balls 1:2, the corresponding velocities will be 2:1.

In these experiments we have a fair representation of the case of the gun: the spring is the expansive force of the powder, the large ball is the gun, and the small ball is the shot Can the conclusion be doubted that the force of recoil is to the force of the shot as the weight of the shot is to the weight of the gun. If the weight of the gun be 100 lbs. and the shot 1 lb., then the force of the shot will be 100 times that of the gun.

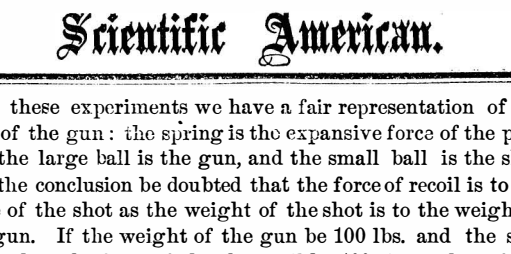
Those who are well skilled in mechanics will reach the same conclusion by a shorter road. The formula MV^2 expresses the value of the force of a body. The weight (M) of the shot and of the gun of course are known, and as soon as it is determined that the velocities of shot and gun are inversely as their weights, the problem is solved. Thus, let the weights be as 1 to 100, then the velocities will be as 100 to 1, and the expression for the force of the shot will be $1\times(100)^2=10{,}000$, and the force of recoil $100\times(1)^2=100$. But 10,000 : 100 : : 100 : 1.

It is a plain result of the theory above given that the force of the recoil is directly proportioned to the amount of powder used. And in a given gun is proportioned to the weight of the shot, or if the shot be the same, to the weight of the gun. By doubling the weight of the shot the recoil is doubled.

If the prevailing notion about recoil were true, we should have a very different system of warfare, for the danger in battle would be to those who fired the guns. It involves, also, other absurd consequences, such as that in the steam engine half of the force of the steam is lost on the end of the cylinder, and that we can never utilize the whole of any force.

In conclusion, I am obliged to say that the guns and shot I have spoken of are model and theoretical guns, and that there are difficulties in the way of directly applying the theory to actual practice. The force of the powder does not show the whole of itself in the shot and in the recoil. A notable amount is lost in the concussion of the gun, windage, and in overcoming the friction of the shot. This last is a very important circumstance, as it holds back the shot, giving the gun a longer time than due it to absorb the powder force. The ratio of recoil to shot will always be greater than by the simple formula I have given. The guns need more lubricators. And it will be seen that there is plenty of room for practical experiments; nothing to-day would more please me than to read reports of intelligent practical tests.

PROVING A GREAT GUN.—The second big gun (20 inch) cast at the Fort Pitt Foundery has been tested with charges of 60, 80, and 100 pounds of powder, and shot weighing 1,020 pounds. The trial was under the inspection of Commodore Taylor, of the United States Navy, now on inspection duty at the works, who was well satisfied with the trial and pronounced the gun thoroughly fitted for duty.



ISSUED FROM THE U. S. PATENT OFFICE

FOR THE WEEK ENDING JAN. 22, 1867.

Reported Officially for the Scientific American.

PATENTS ARE GRANTED FOR SEVENTEEN YEARS, the following being a schedule of fees:—

On filing each Caveat	$10
On filing each application for a Patent, except for a design	$15
On issuing each original Patent	$20
On appeal to Commissioner of Patents	$20
On application for Reissue	$30
On application for Extension of Patent	$50
On granting the Extension	$50
On filing a Disclaimer	$10
On filing application for Design (three and a half years)	$10
On filing application for Design (seven years)	$15
On filing application for Design (fourteen years)	$30

In addition to which there are some small revenue-stamp taxes. Residents of Canada and Nova Scotia pay $500 on application.

☞ Pamphlets containing the Patent Laws and full particulars of the mode of applying for Letters Patent, specifying size of model required, and much other information useful to inventors, may be had gratis by addressing MUNN & Co., Publishers of the SCIENTIFIC AMERICAN, New York.

61,304.—CABBAGE CUTTER.—Henry Aeuer, Muscatine, Iowa.

First, I claim the manner substantially as herein described and shown of arranging a series of scroll knives on a rotary bed, and beneath a stationary hopper, so that two or more knives are made to cut at the same time, under the same hoppers, as shown.

Second, The arranging with a cabbage cutter bed, such as described, of the frame, A B, with box, E, hinged legs, G G, guard board, F, and bracket extension, substantially as described, and for the purposes set forth.

61,305.—MELODEON.—Charles Austin, Concord, N. H.

I claim as my invention the arrangement as well as the combination substantially as above specified, of a lever, E, and one or more additional reeds, i i, and the operative apparatus thereof, as explained, with the exhaust chamber, D, and a main reed key, A or B, thereof, the same being so that on pressing down the said key for the purpose of opening the main reed valve thereof, the lever, F, shall be moved so as to put in operation each additional reed operative apparatus, whereby its reed or reeds may be sounded simultaneously with the main reed.

61,306.—FAN TOOL FOR CUTTING MOLDINGS.—Edwin C. Austin, Monroe Village, Wisconsin.

First, I claim the knives, C, constructed with the projections or bearings, c, pressing upon the surface of the wood in advance of the cutting edge, substantially as and for the purposes specified.

Second, The tool herein described for cutting rope or screw molding, constructed and operating substantially as described.

61,307.—DOUGH MIXER AND ROLLER.—J. Bailie and J. Gervers, Cincinnati, Ohio.

First, We claim the combination of the rolls, D D, with the worm or screw dough mixer, A, in the manner and for the purpose set forth.

Second, We claim the combination of the carrying band or belt, I, and slabbing rolls, D D', with a worm or screw dough mixer, in the manner and for the purpose substantially as specified.

Third, We further claim the combination and arrangement of the spur and worm gear as shown for regulating the speed and giving a positive motion to the screw, A, slabbing rolls, D D', and carrying band, I", for the purpose and in the manner substantially as described.

61,308.—BILLIARD CUSHION.—A. Bassford, New York City.

First, I claim in a billiard cushion the use of metall c ribbon or other hard and elastic strip interposed between two pieces of vulcanized india rubber of different degrees of elasticity, or within a rubber cushion substantially as herein set forth.

Second, In billiard cushions constructed substantially as set forth, I claim the arrangement herein described and represented, whereby one block of india rubber is backed and supported by the other.

Third, I claim the two blocks or strips of vulcanized rubber, of unequal degrees of elasticity as described, in combination with the spring steel ribbon and rubber packing, arranged substantially as and for the purposes herein set forth.

61,309.—APPARATUS FOR CARBURETING GAS AND AIR.—John F. Boynton, Syracuse, N. Y.

First, I claim in a carbureting box or vessel a tube or tubes, whether flat, cylindrical, or of other form, filled with fibrous or capillary material, and so arranged with openings at the bottom that the carbonizing fluid will be constantly drawn by capillary action from the lower and heavier strata, and subjected to evaporization in the upper portion of the vessel, substantially as described.

Second, In a carbureting box or vessel constructed and operating as herein described, I claim so arranging the capillary tubes that the gas in its passage through the vessel will move slowly in a thin stratum over the ends of the wicks containing the carbonizing fluid substantially as described.

Third, I also claim dividing the carbureting vessel into two or more compartments, by soldering one of the plates forming each of the double partitions or wick tubes to the bottom and sides of the vessel, so that two or more different carbonizing fluids may be used in the same vessel, without mixing previous to evaporation.

61,310.—THILL COUPLING.—John F. Bridget, Washington, D. C.

I claim the combination of the set screw, G, and socket plate, H, and spring, K, operating to raise the end of the thill in its bearings, substantially as and for the purpose described.

61,311.—BASKET ATTACHMENT FOR PISTONS OF DEEP WELL PUMPS.—Erasmus D. Brown, Buffalo, N. Y.

I claim the slotted flaring basket, A, for the purposes and substantially as described.

61,312.—BOAT DETACHING TACKLE.—Samuel Brown (assignor to the Brown and Level Life Saving Tackle Company), New York City.

I claim a boat-connecting apparatus, composed of the ring, a, hook, c, and chains, b g, and which is disconnected from the block by slacking the chain, g, in the boat to be launched, substantially in the manner and for the purpose described.

61,313.—MANUFACTURE OF BRANDY.—D. Jay Browne, Cambridge, Mass., and Steuben T. Bacon, Boston, Mass. Antedated Jan. 14, 1867.

First, We claim the blending of brandy or spirits distilled from sorghum sirup, with brandy distilled from fermented grape juice, water and sorghum sirup, or glucose, substantially as herein set forth.

Second, In the production of brandy from the combination of the above-named materials, we also claim the mode of fermenting in close casks, or vats, furnished with tubes or coils within, for regulating the temperature of the liquids while fermenting, substantially as herein specified.

Third, In the production of brandy from the above-named ingredients, as necessary to secure success, we also claim the process of distilling in vacuo, substantially as and for the purposes herein described.

61,314.—PROCESS OF MAKING SUGAR.—Duncan Bruce, Rossville, N. Y. Antedated Jan. 17, 1867.

First, I claim the combination of the vacuum chamber and condensing chamber, with one or more evaporatory chambers, having steam or hot water heaters applied to them, substantially as described.

Second, The combination of one or more air-tight vessels with one or more air-tight evaporators and a condensing chamber, D, which communicates with a vacuum chamber, E, substantially as described.

61,315.—APPARATUS FOR DECOMPOSING ANIMAL AND VEGETABLE SUBSTANCES, FOR CURING MEAT, TANNING, ETC.—Duncan Bruce, Rossville, N. Y. Antedated Jan. 17, 1867.

First, I claim an apparatus consisting of a series of air-tight vessels communicating with a condensing vessel, and also with a vacuum reservoir, having a forcing and exhausting engine applied to it, the whole to be used substantially as described in the treatment of vegetable and animal matters.

Second, Curing meat by the means and in the manner substantially as herein described.

Third, The process, substantially as described, of obtaining grease from fatty substances, by subjecting these substances to the action of moist heat in a vacuum.

61,316.—PRESERVING GREEN CORN.—S. John Carroll, Baltimore, Md.

I claim preserving green corn in the manner substantially as herein set forth and described.

I also claim the new article of manufacture and commerce, green corn preserved substantially as herein set forth and described.

61,317.—BUTTON.—Henry T. Carter, Portland, Me.

I claim a button provided with a slitted and pointed shank, c, in combination with the disk, d, and washer, b, substantially as described and for the the purpose specified.

61,318.—MACHINE FOR PRESSING FUEL INTO BLOCKS OR BRICKS.—John B. Collen, Philadelphia, Pa.

I claim a machine constructed, arranged, and operated substantially as herein described and represented, for the purpose of pressing artificial or natural fuel in a fine or granular state into blocks or bricks for transportation and for burning, as set forth.

61,319.—PUMP.—H. Comstock, Seneca Falls, N. Y.

I claim, First, The combination of the rubber cup or flange, f, with the metallic leather packing, c, operating substantially in the manner and for the purpose specified.

Second, The groove, g, in the bottom of the cylinder, in combination with the valve yoke, C, operating substantially as and for the purpose set forth.

61,320.—DENTIFRICE.—John G. Cook, Lewiston, Me.

I claim as a dentifrice a chlorate compound, made up of ingredients, substantially as described.

61,321.—SAFETY PAPER.—L. M. Crane, Ballston, N. Y.

I claim, First, The inserting or incorporating of one or more threads or strips of gutta percha, or a material possessing like properties, into the pulp or fiber of paper during the manufacture of the same, and in such a manner that said threads or strips will be softened and firmly united to the fiber under the heat of the drying cylinders, substantially as set forth.

Second, I also claim, as an improved article of manufacture, a safety record paper, made substantially as herein shown and described.

61,322.—MACHINE FOR PREPARING COTTON, ETC.—W. Crighton and F. W. Crighton, Manchester, Eng. Patented in England April 3d, 1861.

We claim, First, The arrangement hereinbefore described consisting of placing the beaters or openers on a vertical axis, and forming the place or opening for the delivery of the cotton at the top of said case, or at a point higher than that at which the cotton is fed into the machine, said machine being also constructed and its parts so arranged that a considerable portion of the dirt will be delivered either at the bottom of the beater case or cone, or through open rings at a lower point than that at which the prepared cotton is delivered, substantially as hereinbefore set forth.

Second, The combination with a beater case, and beaters, or other similar apparatus for cleaning cotton of the carrier or series of dirt boxes, d, substantially as hereinabove set forth.

61,323.—BLAST FOR IRON AND OTHER FURNACES.—Felix A. T. de Beauregard, Paris, France.

I claim surrounding the furnace by a tank the water within which is converted into steam by the heat of said furnace and then discharged through suitable pipes or conduits arranged substantially as herein described, so the discharge of the said steam shall induce a blast within and through the furnace, as set forth.

61,324.—STEAM GENERATOR.—Jules Delery, St. Bernard Parish, La.

I claim the isolating check valve, b, connecting rods, E and L, and lever, J, in combination with the generator and water communication pipe, substantially in the manner shown and described.

61,325.—TELEGRAPHIC CABLE.—A. J. B. De Morat, Philadelphia, Pa.

I claim the construction of telegraphic cable by means of insulated tubes or continuous cylinders, formed of helically wound strips in such manner as to preserve uninterrupted linear conduction in case of stretching, as herein set forth, or any other substantially the same, and which will produce these intended effects.

61,326.—WHEAT DRILL.—Geo. W. Doolittle, Lincoln, Ill.

First, I claim the jointed frame, A C, to which the compressing wheels, D E, are attached, in combination with the funnels, L L, depositing tubes, K, angular bars, I I, cutter blades, H H, substantially as arranged for the purposes set forth.

Second, I claim the arrangement of the standard, P, lever, m, caster, n, for controlling the depth of the drills, K, or lifting them out of the earth in combination with the drills or delivery tubes, and the mechanism for regulating the quantity of seed, substantially as herein described for the purposes specified.

61,327.—WASHING MACHINE.—George H. Dow, Freeport, Ill.

I claim the arms, E E', roller upper board, C', and pressure board, F, in combination with the concave washboard, H, lower roller board, C, and springs, D, arranged as and for the purpose set forth.

61,328.—BARREL BUNGS.—M. S. Drake, Newark, N. Y.

I claim, as a new article of manufacture, a bung for barrels, casks, or cases, constructed substantially as specified.

61,329.—TAIL BOARD FOR WAGONS.—Joseph O. Farrell, Chicago, Ill.

I claim providing the tail boards with a double latch, constructed substantially as described, that is to say, consisting of a rod and two rack bars rigidly connected and vibrating in journals in or on the tail board under the impulse of the hand, or of the spring, so that they shall traverse the openings in the braces, I, as the tail board is moved, and when abandoned to the influence of the spring shall afford support to the tail board by the engagement of the notches, substantially as described.

61,330.—SAFETY VALVE.—John H. Fitz Simmons, Susquehanna Depot, Penn.

I claim the combined valves, F and E, with valve seats, A and C, the steam pipes, G G, together with the releasing screw, X, as herein described and for the purpose set forth.

© 1867 SCIENTIFIC AMERICAN, INC.

61,331.—CHERRY STONER.—F. G. and E. A. Floyd, Macomb, Ill.

First, We claim the knife or stone retainer, o, when constructed in the manner shown, and supported on the single arm to permit it to operate in connection with the reciprocating bar, c, substantially as herein set forth.

Second, The reciprocating bar, c, having the plates, n, attached and provided with the holes, e, when used in combination with the knives, o, substantially as shown and described.

Third, The hopper, B, reciprocating bar, c, knives, o, and bed piece, e, all arranged and operating as described.

61,332.—CLAMP FOR RAISING TIMBER FRAMES.—E. G. Ford and H. Weible, Delphos, Ohio, assignors to E. G. and J. G. Ford.

We claim the hinged bars, C D, constructed and arranged to operate substantially as and for the purpose set forth.

61,333.—SHAKER ATTACHMENT FOR THRASHING MACHINES.—David Frost, Dupage, Ill.

I claim the application of the slotted lapping plates, confined together by a thumb screw, to the pitman and vibrating knockers or shakers of a straw-carrier belt all in the manner and for the purpose described.

61,334.—MACHINE FOR RIVETING BUTTONS TO FABRICS.—W. J. Gordon, Philadelphia, Pa.

I claim, First, The lever, H, in combination with the spindle, D, having a pointed projection, i, when the lever is provided with a beveled eccentric projection, w, or its equivalent, and when the spindle is so constructed and arranged, in respect to the lever, that on operating the latter, the spindle will turn around as it descends, for the purpose specified.

Second, The combination of the above with the sleeve, E, having a projection adapted to the cavity in the button, and with the springs, h and n, the whole being arranged for joint action, as and for the purpose described.

Third, The concavity so formed in the base, A, in respect to the head of the rivet, and to the devices for spreading the latter, that, on forcing the rivet into the said concavity, the edges of the said head will be turned up, as and for the purpose described.

61,335.—SUPPORT FOR WINDOW SASH.—Ellen M. Griswold, Hagerstown, Md.

I claim the application to window frames of a sash support composed of the adjustable pieces, C C' C'', connected by hinges, substantially as and for the purposes set forth.

61,336.—APPARATUS FOR DETACHING BOATS.—Increase S. Hill, Boston, Mass, and Andrew Burnham, Chelsea, Mass.

We claim, First, The arrangement of curved disengaging rods in guides along by the gunwale of a boat, substantially as herein described, when the same are connected with a pivoted lever through the operation of which the disengaging rods are simultaneously retracted liberating the links by which the boat is suspended.

Second, A graduating coupling in the disengaging rods by means of which the lengths thereof may be so adjusted as to secure simultaneous disengagement of the suspending links, as and for the purpose described.

61,337.—CAN FOR PAINT, ETC.—William A. Hopkins, New York City.

I claim the combination of the can, cover, ears and clamps when the same are combined, constructed, and operate substantially as shown for the purpose specified.

61,338.—WRITING PAPER.—J. E. Hover, Philadelphia, Pa.

I claim as a new manufacture, writing paper, the surface of which is coated with chalk or other material which will neutralize the acids in writing inks or fluids.

61,339.—APPARATUS FOR OBTAINING AND APPLYING MOTIVE POWER.—William Huston (assignor to himself and H. N. Wickersham), Wilmington, Del. Antedated Jan. 19, 1867.

First, I claim the combination of the disk, F, and its chamber, X, and the disk, F', and its chamber, X', with the piston, G, the whole being arranged for joint action, substantially as and for the purpose herein set forth.

Second, In combination with the above, I claim the heads, B and B', with the recesses and openings arranged substantially as described.

Third, The combination of said disks, piston and heads with a casing, A.

61,340.—WRENCH.—Joel C. Jackson, Rochester, N. Y. Antedated Jan. 17, 1867.

I claim the peripheral recesses or groove, o, in the wrench barrel, c, formed with ratchet teeth in its bottom surface, in combination with the stop lever pawl, d, within the stock, b, as and for the purposes set forth.

61,341.—FILE CUTTING MACHINE.—A. F. Johnson, Boston, Mass., and M. P. Griffin, Medford, Mass.

First, We claim the combination of a swiveling head with a rotary stock, substantially as described.

Second, The combination of a chisel and adjuster with a rotary stock, in the manner substantially as described.

Third, Placing the chisel and adjuster together in the same stock, when constructed and arranged as described.

Fourth, The lever, D, in combination with the tool stock.

Fifth, The adjustable screw jaws, T U, in combination with the ratchet, f, the screw, S, and bed, B.

Sixth, Inserting rubber blocks at the ends and between the bows of the elliptic springs, I I', in a file-cutting machine, constructed substantially as described.

61,342.—CAST-IRON CHIMNEY.—David June, Fremont, Ohio.

I claim the section, B, in two parts, C C', with cavities, E E, in combination with section, B', in two parts, constructed and arranged together as and for the purpose herein described.

61,343.—WASHING MACHINE.—C. H. Knox, Mt. Pleasant, Iowa.

I claim the bolt, R, in combination with the clamp. T, friction roller, L, plates, K and F, as set forth.

61,344.—SELF TRACK-LAYING CAR.—Jesse S. Lake, Smith's Landing, N. J.

First, I claim the combination with a track car or vehicle of the within-described revolving track consisting of an endless series of trucks or floats, I P Q L, connected together by flexible chains, cords or straps, K, and operating in the manner and for the purpose specified.

Second, I claim the combination with the runners or ways, H H, cylinder, G, and crutch, M, of the flanges, B B B' B', the latter, B', being hinged or pivoted to admit of lateral adjustment in order to vary the course of the car or vehicle, substantially as described.

61,345.—CARTRIDGE BOX.—M. C. Leonard, Washington, D. C.

I claim a cartridge lined with sheep skin, or other equivalent material, and for the purpose set forth.

61,346.—WINDOW-SHADE SUPPORTER.—T. J. Marinus, Independence, Iowa.

I claim, in a window shade, the combination of the clamp composed of the lever, H, the hollow frame, F, and spring, I, with the cord for raising the shade, all constructed in the manner and for the purpose herein set forth.

61,347.—QUARTZ CRUSHER.—Carlile Mason, Chicago, Ill.

First, I claim the conical crushing disks, m, having their faces corrugated, substantially as shown, and arranged to operate in connection with each other, as set forth.

Second, The tension frame consisting of the rods, y, and the keys or wedges, a, arranged to operate in connection with the crushing disks, m, as shown and described.

Third, In combination with the tension frame as above described, I claim the spring beams, w, and the set screws, e, arranged and operating as and for the purpose set forth.

61,348.—BUNG FOR BEER BARRELS.—J. E. McBeth, New Orleans, La., assignor to himself and J. W. Chamberlain.

First, I claim the rubber ring, D, substantially in the manner and for the purposes described.

Second, I claim the combination of the parts, B and C, substantially in the manner and for the purpose described,

Third, I claim the combination of the parts, B C and D, substantially in the manner and for the purposes described.

61,349.—INSTRUMENT FOR GUIDING TAILORS IN CUTTING OUT COATS AND VESTS.—Herrman Mengel, Philadelphia, Pa.

I claim a plate, A, and adjustable strip, E, in combination with an adjustable plate, B, adjustable strip, C, and strip, D, or its equivalent, the whole being constructed, graduated and arranged substantially as and for the purpose described.

61,350.—MODE OF PRINTING ON GLASS.—Isaac L. Miles, Charlestown. Mass.

I claim transferring an impression form of elastic type having a rounded or curved surface to flat plate or sheet of glass by rolling the latter over and in contact with ways arranged adjacent to and having a curvature corresponding with that of the face of the form of type, as described.

61,351.—CENTER BOARD AND BOX FOR VESSELS.—D. P. Nickerson, Cleveland, Ohio.

First, I claim the arrangement of a metallic center board constructed with the two sides, G G, the brace, I, and stay bolts, H, in combination with the metallic box, B, for the purpose and in the manner set forth,

Second, The portable metallic center board box constructed with braces, C, and angle irons, D, as and for the purpose set forth.

61,352.—WASHING MACHINE.—George Palmer, Littlestown, Pa.

I claim the washing cylinder, D D, as constructed with the revolving bars or rollers, F F, into which cylinder the clothes are placed and secured to be washed with the balls, I I I, constructed as shown and described, the washing apparatus being arranged and combined with the gear wheels, d and e, and the crank handle, E, operating substantially in the manner herein described or the purposes specified.

61,353.—CLOTHES WRINGER.—George Palmer, Littlestown, Pa.

First, I claim placing ribs of metal longitudinally in hard wood rollers for clothes wringer, when covered with elastic substances, substantially as herein set forth.

Second, I claim, in combination with clothes wringer rollers as described, the pressure lever, Q, balls, v, or other equivalent, spring and rack bar, Y, operating as and for the purposes herein specified.

61,354.—DEVICE FOR PREVENTING COLLISION OF LOCOMOTIVES.—Henry Payne, Sr., Mount Vernon, Ohio.

I claim the affixing to locomotive boilers one or more tubes in such manner as herein described, as that by letting steam into them from the boiler, a shaft will be driven or forced forward from each tube to meet any opposing object, and thus prevent collision of the locomotive with the object opposing, or much diminish its force.

61,355.—WRENCH.—John L. Peake (assignor to himself and Louis Guillander), New York City. Antedated January 6, 1867.

I claim the recessed face, a a, on the jaw, A, in combination with the tooth, b, on the jaw, B, adapted to traverse backward and forward by means of the rack, N, segment, M, and lever, C, all arranged for joint operation, so as to act on cylindrical bodies or pipes of different diameters, all in lines at uniform distances from their centres, substantially as herein set forth.

61,356.—COAL SCUTTLE.—John Pfeifer, Philadelphia, Pa.

Producing a close joint between the body, A, and the bottom, B, of the said coal hod, by means of the concavo-convex bead, a' b', substantially as and for the purpose described.

61,357.—SHUTTLE BINDER FOR LOOMS.—J. C. Poland, Jr., Auburn, Maine, and B. R. Cotton, Lewiston, Maine.

We claim a shuttle binder made as a lever, pivoted at or near its centre, when arranged with adjusting screws, d d' by which the angle of the binder can be changed and the binder can be fixed in position, substantially as described.

Also, in the arrangement claimed above, mounting the pivot of the binder on a screw, by which the distance of the whole binder is adjusted with reference to the opposite side of the shuttle box.

61,358.—FLY TRAP.—M. M. Preble, Kokomo, Ind.

I claim the combination of the boxes, A and E, and slides, G and F, the said parts being constructed and arranged substantially in the manner and for the purpose set forth.

61,359.—STEREOSCOPE.—De Witt S. Rawson, Peru, Ill.

I claim the picture box, H, the swinging front, D, and shelves or brackets, E E, substantially as herein described.

61,360.—ICE CREAM FREEZER.—John E. Robinson, Boston, Mass.

I claim, in combination with a freezing vessel, a, the arrangement of a series of cream cylinders, b, to be simultaneously rotated within the same, when each cylinder is so mounted as to be capable of disconnection from the driving mechanism and removed from the freezing vessel, without disturbing the other cream cylinders, substantially as set forth.

I also claim, in combination with such an arrangement and method of operation of the cylinders, the stationary scrapers, held in place during the rotation of the cylinders substantially as described.

Also, mounting each cylinder on a screw shaft, and so as to be removable therefrom, substantially as and for the purpose described.

61,361.—TRUNK LOCKS.—E. A. G. Roulstone, Roxbury, Mass.

I claim the combination of the spring bolt, l, and tumblers, e, or locking mechanism, when constructed and arranged to lock and unlock substantially as set forth.

Also, combining with the projection, o, of the bolt, the flange, r, with the pin, p, for receiving the strain of the bolt, substantially as described.

61,362.—PORTABLE WATER POWER.—Abram Rowe, Macomb, Ill., assignor to himself, Lorenzo F. Whitman and Reson A. Bowie.

First, I claim a portable hydraulic motor for operating machinery, consisting of the propeller or screw wheel, B, enclosed in a case, E, and located in the central bottom portion of a boat, A, as herein shown and described.

In combination with the wheel, E, arranged as shown, I claim the sluice, C, in the front end of the boat having its sides converging as represented.

61,363.—ABRASIVE POWDER.—Jesse Russell, Bath, Maine.

I claim abrasive powders, made by reducing and grading the material above described.

61,364.—METHOD OF UTILIZING WASTE EXTRACTS OF FIBROUS PLANTS.—George E. Sellers, Sellers' Landing, Ill.

First, I claim the vegetable extract of fibrous plants, when obtained in the process of preparing fiber paper stock, in the manner and for the purpose substantially as described.

Second, the utilization of the vegetable extract of cane (arundinaria macrosperma) and other fibrous plants, when obtained from them in the process of preparing their fiber for paper stock without other chemical agencies than water or heat, as a new article of commerce.

61,365.—BASE BURNING STOVE.—Charles J. Shepard, Brooklyn, N. Y.

First, I claim the use or employment of the chamber, B, constructed and operating substantially as described, for the purposes set forth.

Second, I claim in a stove with the upper or reservoir chamber constructed substantially as shown, a door placed in position relatively to the grate as shown for the purposes herein fully indicated.

Third, The use or employment of water, substantially as shown, for the purposes set forth.

61,366.—HYDRANT.—Joseph Nottingham Smith, Jersey City, N. J.

I claim the tubular flanged valve, F, operating substantially as herein specified.

I also claim the inverted cup-shaped valve seat, D, in combination with the valve, F, substantially as herein described.

I also claim the filter, L y, arranged in the hydrant as herein set forth.

I also claim the combination of the filter tube, L, with the valve, F, substantially as and for the purpose herein set forth.

I also claim the flexible packing, Q, in combination with the cups, P and T, substantially in the manner and for the purpose herein specified.

61,367.—WINDOW-SCREEN FOR RAILROAD CAR.—F. U. Stokes, Cincinnati, Ohio. Antedated Jan. 6, 1867.

I claim a sash frame for a railway car window, constructed in such a manner that the upper half may be set with glass, and the lower with wire gauze or analogous material, the whole being combined together in the manner and for the purpose herein set forth.

61,368.—MODE OF PRINTING PHOTOGRAPHS.—Joseph Wilson Swan, Newcastle-upon-Tyne, England.

First, I claim the preparation and use of colored gelatinous tissues, substantially in the manner and for the purpose set forth.

Second, The mounting of undeveloped prints, obtained by the use of colored gelatinous tissues, in the manner and for the purpose set forth.

Third, The retransfer of developed prints, produced as above described, from a temporary to a permanent basis.

61,369.—MANUFACTURE OF SHOE LACINGS.—J. P. Ferrell, North Bridgewater, Mass.

I claim combining with friction surfaces having a relative reciprocation, a co-operating mechanism which shall draw or feed the strip between these surfaces, substantially as and for the purpose set forth.

I also claim in combination with such an arrangement or organization mechanism for releasing the strip from the nippers, mechanism for separating the abrading surfaces, and mechanism for returning the parts to normal position, substantially as set forth.

61,370.—HANGER BOX FOR CRANK SHAFTS.—Thomas Welch, Churchville, N. Y.

First, I claim providing the hanger journal of the crank shaft or other journals of harvesters with self-adjusting or self-lining bearings, or boxes, substantially as and for the purposet shown and described.

Second, The application of the wedge, E, with or without a set screw when used in combination with the box in which the journal revolves, for the purpose of compensating for the slack that might otherwise occur, by the wearing away of the parts.

Third, The set screw, S, in combination with the self-adjusting or self-lining boxes of harvesters, substantially as and for the purposes set forth.

Fourth, In combination with the self-lining or adjusting boxes and journals, the oil reservoir substantially as shown, and for the purpose described.

Fifth, In combination with a set screw and self-lining or self-adjusting boxes in harvesters, the cap, I, or its equivalent for the purposes described.

61,371.—PROCESS FOR PURIFYING AND CLEANSING SIZING FOR PAPER, ETC.—Norman J. Wells, Huntington, Mass.

I claim the use of alum or other equivalent mentioned, in the process of preparing sizing, when used and applied in the manner substantially as herein described and for the purpose set forth.

61,372.—CHEESE VAT.—Amos Westcott, Syracuse, N. Y.

I claim the method above described of constructing, attaching and rendering adjustable, the leg, D, substantially as and for the purposes set forth.

61,373.—PISTON FOR STEAM ENGINES.—William D. Whitmore, Boston, Mass.

I claim my improved ring section and wedge piston as made not only with its ring sections and their wedges wholly within and suported by a case, C, separate from and to be attached to the cap, B, by screws, but as having the cap, B, applied to the piston rod, A, the whole being substantially as and for the purposes hereinbefore set forth.

61,374.—BED BOTTOM.—Newel J. Willis, Waltham, Mass., assignor to himself and Ammi Brown, Boston, Mass.

I claim the improved construction of the slat lifter, B, and arrangement of it and its springs relatively to the slat, A, the whole being as described, the part, c, of such lifter under such arrangement, being made throughout its length to bear against the underside of the slat and the springs to extend wholly below the part, c, and the slat as explained.

61,375.—SEED DRILL AND CULTIVATOR COMBINED.—John P. Zeller, Bourbon, Ind.

I claim, First, The frame, A, constructed as described, with the hinges, d loop, g g, studs, h h, loops, f f, studs, 5 5, and tongue, D, in the manner and for the purposes herein fully set forth.

Second, The wheels, B and B' with corrugations upon their inner faces and connected to the frame by the short axle, cog bars, P, and metal slides in the manner and for the purposes specified.

Third, The arrangement of the shaft, C, with cog segments, O O, which mesh into the cog bars, P P, and used for elevating or depressing the frame, A, in the manner as set forth.

Fourth, The drag, L, with shoe, M, and roller, constructed as set forth, and used with the frame, A, as specified.

Fifth, The arrangement of the detachable drilling device, G, constructed specified and used in combination with the frame as specified.

Sixth, The corn cultivator attachment, H, when used with the frame, A, as set forth.

61,376.—A GIG OR MACHINE FOR RAISING THE NAP UPON CLOTH, COMPOSED OF THE FOLLOWING ELEMENTS.—Anton Zschille, Grossenhain, Kingdom of Saxony, assignors to L. T. Downes.

I claim, First, A gig or machine for raising the nap upon cloth, composed of the following elements. 1st, A mechanism for moving the cloth through the machine so as to present plane surfaces to the action of the teazles. 2d, One, two or more pairs of plane surfaced independent teazle plates with mechanism for moving the same, while maintaining their parallelism with the cloth, in arcs of a circle or otherwise, so that each plate shall continuously move toward the cloth, sweep transversely and in contact with the cloth from the center toward the sides thereof, and then recede, and return toward the center.

Second, I also claim the means herein described for engaging or disengaging the cloth with or from the teazle plates, and regulating their pressure of contact, substantially as shown and set forth.

Third, I also claim the method of teazling cloth by machinery, substantially as herein shown and described, that is to say by imparting to the teazling surfaces the following motions, viz: to and from the cloth and also at right angles to the run thereof, so that the nap shall be raised crosswise from the center or thereabouts to the sides as described.

61,377.—SAW SET.—W. A. Alexander, Mobile, Ala.

I claim the combination of the lever, B, pivoted in the block, A', with the recess, b, and the set screw, c, in the block, A, forming an adjustable saw set, constructed and operating substantially as herein described.

61,378.—KINDLING FIRES.—Dexter B. Andrews, Fort Wayne, Ind.

I claim a composition for kindling fires compounded from the materials and substantially as set forth.

61,379.—COMPOSITION FOR THE MANUFACTURE AND PRESERVING LEATHER.—Robert Andrews, Milwaukee, Wis.

I claim making the composition out of the materials named in the manner named and to secure to me the right of using such a composition, and of applying it to leather in the process of manufacture or after it is manufactured and to all articles made of leather, disclaiming every thing but the composition.

61,380.—CORSET AND SKIRT SUPPORTER COMBINED.—William Bacheller, West Newberry, Mass.

I claim in combination with an ordinary corset, the skirt supporter for which Letters Patent were granted me May 29, 1866, adapted to be worn and secured together in the manner as and for the purpose specified.

61,381.—GOVERNOR.—William Bakme, New Media, Pa.

I claim the arrangement upon the mill shaft of a pivoted governor ball and arm to actuate a detaching apparatus for the water gate levers, substantially as described.

61,382.—PAPER RULING MACHINE.—George A. Ball, San Francisco, Cal.

First, I claim the division of the cylinder into any number of sections with nippers working between each section and the introducing the movable blocks, i i i, between each nipper to preserve the circular form of the cylinder in combination with the nippers, substantially as described.

Second, Covering the cylinder with india-rubber cloth, Z, and placing upon the edge of each section where the nippers strike a strip of gutta percha, Z', as described and for the purposes set forth.

Third, The gage, j, rolls, l l, and lock nuts, m m, affixed to the feed board, in combination with the feed board R.

61,383.—APPARATUS FOR AMALGAMATING ORES.—Abner Bassett, Virginia City, Nevada.

First, I claim the barrel, e, or its equivalent, having a hollow shaft, o, passing through it, by which heat is introduced by exhaust steam or otherwise, substantially as described and for the purpose set forth.

Second, I claim the hot-air shell or bath, g, for the purpose of applying heat by exhaust steam or otherwise, to the outside of the vessel containing the pulp, whereby obdurate ores are made to amalgamate more freely, substantially as described and for the purpose specified.

Third, I claim the application of steam or heat to the ore or pulp, both through and around it, without coming in direct contact with it, the said ore or pulp being confined in some suitable vessel, said vessel being inclosed in a shell or bath, for the purpose herein set forth.

61,384.—EDGE PLANE FOR BOOTS AND SHOES.—Willigam Bayhouse, Portland, Oregon.

First, I claim an edge plane having a cutter, D, with straight and concave edges, and the adjustable slotted guard, F, placed over the said cutter, substantially as described and for the purpose set forth.

Second, The guay, C B, with slots, b and b', and the screw, I, for elevating the cutter, in combination with the screw, G, and thumb nut, H, substantially as described and for the purposes set forth.

61,385.—SORGHUM STRIPPER.—Amos Bean, Canaanville, Ohio.

First, I claim an improved cane stripper, formed by the combination of the adjustable spring knives, B, and cast-iron box or frame, A, said parts being constructed and arranged substantially as herein shown and described.

Second, The combination of the levers, C, with the spring knives, B, and box or frame, A, substantially as herein shown and described, and for the purpose set forth.

61,386.—SIFTING DEVICE FOR GRATES.—Jacob Beesley, Philadelphia, Pa.

First, I claim a grate, d, for receiving the ashes and cinders, in combination with the sliding frame, C, and projections, e e, the whole being constructed and operating beneath the fire grate of a stove heater or furnace, substantially as and for the purpose herein set forth.

Second, The ribs, c c, with their recesses, x x, in combination with a grate d, and with the sliding frame, C, and its lugs, e e, the whole being arranged substantially as described.

Third, The combination of the detachable box, B, grate, d, and sliding frame, C, the whole being constructed and operating substantially as specified.

61,387.—COWL.—W. F. G. Beeuwkes, Holland, Mich.

I claim the arrangement of the guard pipes or casings, C F, plate, H, and short cylinder, J, for projecting the roof from the heat of the chimney, substantially as herein shown and described.

61,388.—APPARATUS AND PRESERVER FOR RECTIFYING ALCOHOL AND OTHER SPIRITS.—Jean Gustave Bequet, Paris, France, assignor to himself and Moritz Pinner, New York City.

First, I claim introducing chemicals into a rectifying or distilling column for the purpose of analyzing or purifying, in whole or in part, the contents of such column.

Second, Introducing such chemicals at option either in their natural state or mixed with water or other suitable liquids.

Third, Introducing water into a rectifying or distilling column, in such a manner as to cause the mixing of such water with all or part of the contents of such column, for the purposes herein set forth.

Fourth, Introducing such chemicals, pure or mixed, or such water into such column, substantially by the means or in the manner herein described.

Fifth, Constructing a rectifying or distilling apparatus, in such a manner that one boiler or still can supply and keep at work two columns, or at option more, at a time.

Sixth, Constructing a rectifying or distilling apparatus, in which two columns, or at option more, are connected with each other in such a manner that thereby the contents of one column can, in whole or in part, be passed into another column without interrupting the process of rectification, distillation, analyzation, or condensation.

Seventh, Constructing an analyzer of a series of tubes or cylinders, substantially like the upper compartment of the analyzing condenser, G 4, herein described.

Eighth, Constructing a condenser of a series of tubes or cylinders, substantially like the lower compartment of the analyzing condenser, G4, herein described.

Ninth, Constructing the analyzing condenser, G4, of a series of tubes or cylinders, and dividing the same into compartments, substantially as described and for the purposes named.

Tenth, Providing a rectifying or distilling apparatus, with a vessel, V28, for the reception or distribution of chemicals, substantially as described and for the purposes set forth.

Eleventh, Providing a rectifying or distilling apparatus with one or more tubs or vessels, T29, for the mixing of chemicals with liquids, substantially as described and for the purposes set forth.

Twelfth, Supplying each or all of such tubs, T29, with a float or self-acting stop cock, 50, for the purpose of regulating the quantity of liquid required in each tub.

Thirteenth, The three-way stop cock, 75 76 77 78, or any desirable number of the kind, constructed substantially as herein set forth and used as described.

Fourteenth, Connecting such three-way stop cocks with steam chambers or pipes, substantially in the manner and for the purposes herein set forth and described.

Fifteenth, The pipes, 15a and 15b, in connection with pipes, 16a 16b 16c and 16d, and stop cock, 90 10 and 9, the whole substantially arranged in such a way as to enable the condensed impurities of any given column to be returned or directed into any given still, substantially as described and for the purposes set forth.

Sixteenth, Regulating by means of valves, 27a and 27b, the quantity of vapors required in any given column for rectifying or distilling purposes, all substantially as described.

51,389.—CHURN.—Jehial Borst, East Cobbleskill, N. Y.

I claim the arrangement of the two dashers, the outer revolving faster than the inner, and both being operated by means of shaft, S, toothed plate, n, idle wheel, o, and gear wheel, m', with its shaft, m, the several parts being constructed and used as and for the purpose specified.

© 1867 SCIENTIFIC AMERICAN, INC.

61,390.—Compound for Telegraph Insulators and for other Purposes.—John F. Boynton, Syracuse, N. Y.

First, I claim as a composition for an electric insulator, a combination of hydrocarbons with silicic acid and silicate of alumina.

Second, I claim the combination of sulphur with the silicate of alumina and silicic acid, for the purpose set forth.

Third, I claim the combination of sulphur, hydrocarbons, silicic acid, and silicate of alumina, as and for the purpose herein set forth.

Fourth, I claim any combination of silicates with sulphur or hydrocarbons, so arranged or combined that when formed into an electric insulator it will be black or dark colored, for the purpose herein specified.

Fifth, I also claim saturating earthen ware, brick tiles, drain pipes, porous stone, wood, cast iron, and other hard, porous substances, with the compounds herein described, after subjecting said substances to a sufficient degree of heat to expel the air and moisture therefrom, substantially as and for the purposes described.

61,391.—Steam Blower.—G. W. Bright, Philadelphia, Pa.

I claim the arrangement of the shaft, A, the hub, B, the wings, C, the screw, b, and the nut, c, with the jets, e, substantially as herein described for the purposes set forth.

61,392.—Tool for Cutting off Boiler Tubes.—R. H. Burke, Greenpoint, N. Y.

First, I claim the cutter head, G, with feed screw, F, and tubular nut, E, in combination with the cutters, H, and pipe, A, constructed and operating substantially as and for the purpose described.

Second, The supplementary sleeves, I, in combination with the pipe, A, and head, G, carrying the cutters, H, substantially as and for the purpose set forth.

61,393.—Cooler for Coffee, etc.—J. Burns, New York City.

First, I claim, as an article of manufacture, the portable cooler herein described, the same consisting of the open mounted pan, A, with perforated false bottom, B, and connecting tube, D, as and for the purpose specified.

Second, The arrangement of the stationary suction blower, E, on the floor, with the pipe, b, below it, in combination with the removable mounted cooler, A B C, supported by its tube, D, as and for the purpose specified.

61,394.—Harvester Cutter.—Caleb Cadwell, Waukegan, Ill.

First, I claim a rotary cutter, consisting of the teeth, I, and links, H, in combination with the blocks, G G' g, when constructed and arranged in the manner and for the purpose specified.

Second, I claim the arrangement of the cutter, H I, blocks, G G', guides, M M', roller, L, spring, L', gearing, D E, shaft, B, and bevel pinions, C C, as herein described and represented.

61,395.—Scaffold.—L. B. Carpenter, Milwaukee, Wis.

I claim the combination and arrangement of the posts, A, the horizontal sliding timbers, E, the arms, F, crank shafts, H, cranks, I, ropes, J, and pulleys, K, with each other, substantially as herein described and for the purposes set forth.

61,396.—Hand Stamp.—Dexter H. Chamberlain, West Roxbury, Mass.

First, I claim the the type wheels, a b c, of different diameters, mounted upon separate and independent axes, as and for the purpose set forth.

Second, I claim the combination of the inking ribbon with two reels and a stud, in such a manner as to form a double fold of the ribbon underneath the type wheels or die block, substantially as and for the purpose specified.

61,397.—Repairing Railroad Rails.—Octave Chanute, Chicago, Ill.

I claim a pile for forming a railway bar, composed of an old or worn rail and a new bar of iron or steel for the head and foot, or either, substantially as herein shown and described.

61,398.—Measuring Funnels.—W. B. Cleves, Binghamton, N. Y.

I claim the peculiar construction of the measure, A, in combination with the gage tube, B, communicating with the inside of the measure above the faucet, C, with the single scale to indicate the quantity in the vessel, and the stand, D, with the adjustable clamp to hold the measure in its upright position, substantially as described and for the purposes set forth.

61,399.—Car Coupling.—Wm. B. Coates, Philadelphia, Pa.

I claim the coupling pins constructed in the manner and for the purpose described in this specification.

61,400.—Filtering Tube for Wells.—Chas. C. Cole, Northfield, Vt.

First, I claim protecting the countersunk strainers, A, by hinged plates, D or stationary plates, B, substantially as represented and described.

Second, The combination of the cone or cup-shaped strainers, G, with the tubing, substantially as herein shown and described,

61,401.—Furnace Shield.—Edward S. Collins, U. S. Navy.

I claim the shield, B, so hung or arranged upon a frame, C H and G, that it can be adjusted to the required angle with regard to the furnace door, substantially as and for the purpose specified.

The combination with the door shield, B, of the fender, A, when arranged together and so as to operate substantially as and for the purposes described.

61,402.—Wheel and Axle Connection.—Henry S. Cook, Boston. Mass.

I claim the improved carriage wheel and axle connection consisting of the plates, a and e, with their studs, c c c, and openings, f f f, operating in combination with the collar, h, as described.

I also claim, in combination with the above-described arrangement of parts, the pawl, i, or its equivalent, substantially in the manner and for the purpose as set forth.

61,403.—Covering for the Head.—Edwin Copleston, Wrentham, Mass

I claim a head covering produced as herein described as a new article of manufacture.

61,404.—Extracting Iodine from Sea Water.—Rene Cupper, New York City.

I claim the process substantially as herein described, for the purpose specified.

61,405.—Washing Machine.—Chas. Daniel, Lamont, Mo.

First, I claim the combination of the adjustable slotted cylinder, C, and the adjustable slotted concave frame, G, with each other and with the box or hub, A, when said cylinder and frame are constructed and operated substantially as herein shown and described.

Second, The clamping device formed by the combination of the movable jointed frame, J, with the concave frame, G, substantially as herein shown and described and for the purpose set forth.

61,406.—Boat-detaching Tackle.—Wm. A. Devon, Port Richmond, N. Y.

I claim the combination of the jaws, A and B, of the pivoted locking clasp, C, with its cam-shaped lever, h, and cheek or face piece, i, for operation on the jaws, substantially as specified.

61,407.—Filter.—Justus Doering, Philadelphia, Pa.

First, I claim the perforated vessel, B, and its pipes, c and d, in combination with the casing, A, and its pipes, f and g, the whole being constructed and arranged substantially as specified.

Second, An inclined discharge pipe, arranged in respect to the concave bottom of a filter, substantially as and for the purpose described.

Third, The pipe, d, with its openings, i, in combination with a filter, substantially as and for the purpose set forth.

61,408.—Gang Plow.—J. H. Douthit, Albany, Oregon.

First, I claim the attaching of the plow beams, F F, to slides, H A, fitted between suitable guides, c c, at the inner sides of the bars, A A, in connection with the foot lever, I, attached to one of the slides, H, and the pin, K, passing through any of a series of holes in the other slide, H, substantially as and for the purpose set forth.

Second, The windlass, L, having the cords or chains, M M', attached, and the latter connected to the plow beams, F F, to operate in the manner substantially as and for the purpose specified.

Third, the windlass, K, having a cord or chain, A, attached, which is connected to the plow beams, F F, one of the bearings of the windlass being fitted in a slide, S, and having a pulley, V, on one end, around which and a pulley, W, on wheel, D, a belt, h, passes in combination with the lever, T, attached to slide, S, all being arranged to operate in the manner substantially as and for the purpose set forth.

61,409.—Skate.—Robt. E. Ellerbeck, Washington, D. C.

First, I claim the laterally adjustable clips, a, attached to the skate on a line diagonal to the longitudinal plane of the blade, A, for the purpose of grasping and securely holding the boot or shoe, when applied thereto, substantially as shown and described.

Second, The projection, o, having a groove formed therein and arranged to operate in connection with the plate, n, and secured by the catch, e, or its equivalent, substantially as set forth.

Third, in combination with the clips, a, arranged as described, I claim the grooved projection, o, and plate, n, spring, f, and catch, e, arranged to operate as and for the purpose set forth.

61,410.—Machine for Cutting Files.—Alfred B. Ely, Newton, Mass.

First, I claim lining the socket and graping the tool in the stock or head with rubber, when the parts are arranged and constructed to operate substantially as and for the purposes described.

Second, Connecting the tool holder or head with the arm shaft, substantially as described.

Third, The spring arm, D, in combination with the rubber lined head, substantially as described.

Fourth, The arrangement of the bars, G, with the head and arm, substantially as and for the purpose described.

Fifth, Regulating the angle of the cutting edge of the tool to the arm or shaft by means of bars and clamps, substantially as described.

Sixth, The combination of the rubber-lined socket with the vertically swiveling head, substantially as described.

Seventh, The combination of the rubber-lined socket with the vertically swiveling and horizontally turning head, substantially as described.

61,411.—Machine for Opening and Cleaning Cotton.—Samuel Fay, Lowell, Mass.

I claim the combination of the beaters, G H and I J, arranged the one within the other, and revolved with the same or different velocities, and in the same or opposite directions, substantially as shown and described.

61,412.—Device for Changing Water into Steam Generators.—Thomas F. Field, Saugerties, N. Y.

I claim the valve, D, applied to and in combination with the change water-feed nozzle of steam boilers, and operating in connection with a feed pipe or hose under pressure, substantially as and for the purposes herein set forth.

61,413.—Knitting-machine Needle.—Levi W. Fifield, Melrose, Mass.

I claim the closer or latch, as made furcated, and with one or more shoulders, d, arranged with respect to the fork as and for the purpose set forth.

I also claim the pivoted closer or latch, as made with the slot, f, to enable it not only to turn upon but slide on its pin, e, as set forth.

61,414.—Globe Valve.—C. L. Frink, Rockville, Conn.

I claim the attachment of the disk, H, to the stem, B, by means of the pin which is fast in the stem, and working in a groove in the disk as herein shown and described.

61,415.—Churn.—Stephen M. Golden, Marcelline, Ill.

First, I claim the arm, D, as operating on the wrist, G, shaft, B, and adjustable bolt, F, as herein described, and for the purposes set forth.

Second, I also claim the construction of the frame, C, with its toothed wheels, K and L, fly-wheel, H, and adjustable piston, D, in combination with the shaft. B, and churn, A, when arranged and operated as herein described and for the purposes set forth.

61,416.—Automatic Toy.—William F. Goodwin, Washington, D. C.

I claim constructing the legs of toys or hobby horses, with bars or pieces joining them together, making hinged or vibrating joints at the several points where the legs are required to bend so that when attached or pivoted on the studs, S, or their equivalents on the shoulders and hips, and acting by the rotating of the cranks, B', the legs are made to move, bending all the joints, raising and turning the foot, stepping, walking, and trotting with both the fore and hind legs and feet, in imitation of the movements of the horse or animal which the toy is made to represent, in the manner and for the purpose substantially as described.

Second, The cranks, B', or their equivalents, operated in any manner or by any means whereby they can be made to rotate, the rotating of which imparts to the legs their vibrating and reciprocating motions, arranged to operate in the manner and for the purpose substantially as described.

61,417.—Director for Uterine Support.—W. G. Grant, Wakeman, Ohio.

I claim the director, A, made in two parts or sections, B, and connected together substantially as and for the purpose specified.

I also claim the pusher, E, in combination with the director, A, substantially as described, and for the purpose set forth.

61,418.—Peat Machine.—Stephen B. Greacen, Norwich, Conn.

First, I claim the combination with the eccentric outer cylinder, B, and irregular cam, E, of the revolving inner cylinder, D, with its separately operating radial slides, b, forming sides to the molds, the whole being constructed and arranged for operation together substantially as and for the purpose herein set forth.

Second, The combination with the revolving cylinder, D, slides, b, and cam, E, of the knife or scraper, f, arranged for operation in relation thereto, as shown and described.

61,419.—Toy Gun.—Albert Hall, New York City.

First, I claim the construction of the stock of a spring toy gun, in two longitudinal halves or sections, a b, secured together by the barrel, C, substantially as herein set forth.

Second, The cylindrical india-rubber spring, g, arranged in relation with the piston, f, barrel, c, and trigger, k, substantially as herein set forth, for the purposes specified.

61,420.—Tool Holder for Planing Machines.—Charles Hall, New York City.

I claim the combination of the tool stock of a planer, with its support or rest, by means substantially as above set forth, so that the tool stock can move a limited distance in two directions, in the line of cutting, whereby two opposite cutting edges may be alternately brought into operation and held there.

61,421.—Reversible Butt Hinge.—William Hancock, Saco, Maine. Antedated Jan. 14, 1867.

First, I claim the hinge, in combination with the washer, for the purpose specified.

Second, I claim a double round edge hinge, as specified in combination with a movable pin or pintle, whereby I am enabled to obtain a "right or left hand" hinge movement from one and the same hinge.

61,422.—Machine for Pulling Flax.—John Harrington, Menomonie, Wisconsin.

First, I claim the rotating reel provided with fixed radial plates, c, and movable plates, J, arranged so as to operate as clamps, and as the machine is drawn along pull the standing flax and deposit it on the platform substantially as set forth.

Second, The cam-shaped grooves, L, at the inner sides of the plates, M, and the pivoted arms, K, to which the plates J are attached, in connection with the rollers, e, at the inner ends of the arms working in the grooves, L, for the purpose of operating the plates, J, substantially as set forth.

The shafts, j, at the outer ends of the plates, c, in connection with the yielding bars, k, at the outer ends of the plates, J, substantially as and for the purpose specified.

Fourth, The combination of the main frame and platform, with the reel arranged with clamps to operate as set forth.

61,423.—Traveling-bag Frame.—George Havell, Newark, N. J.

I claim as an article of manufacture the within-described frame for traveling bags, when constructed and used as and for the purpose specified.

61,424.—Meat Cutter.—James L. Haven, Cincinnati, Ohio.

I claim the mode of securing an entire series of meat cutting or mincing knives, G, by means of a single set screw, L, ribbed plate, F, and slotted case, A B, substantially as set forth.

Second, The provision of ribs, f, on the side of a meat cutter, whether cast on the case or separately, in combination with a correspondingly ribbed loose part, when arranged so that one lateral movement will firmly hold all the knives substantially as set forth.

Third, The mode of securing a series of meat cutting or mincing knives, G, by means of the lateral movement of a ribbed plate, F, against corresponding ribs on the slotted case, A B, substantially as set forth.

61,425.—Apparatus for Automatically Weighing Spirits and Other Liquors.—Samuel K. Hawkins, Lansingburgh, N. Y.

I claim the automatic weighing machine, constructed and operating substantially as and for the purpose herein described.

Second, In combination with the levers, D and C, and the clutch hooks, p p, I claim the drop weight, F, so arranged that the clutch hooks will alternately lift and drop the weight substantially as and for the purpose described.

Third, The combination of the balance levers, D and C, with the mechanism for operating the valves, a, and b b, substantially as described.

Fourth, The combination of the balance lever, D, the gripping bars, G G, the clutch hooks, p p, the weight, F, and the V-shaped slot, V, constructed and operating substantially as described.

Fifth, The dial plate, M, in combination with the index, m, the ratchet-wheel, N', the pawl, n, and the arm, O, operated by a rock shaft substantially as and for the purpose described.

Sixth, In combination with the balance lever, D, and its attachments, I claim the sliding weight, D', substantially as and for the purpose described.

Seventh, In combination with the lower lever, C, and the drop weight, E, I claim the elastic platform, E', substantially as and for the purpose described.

Eighth, In combination with the lower lever, C, the connecting bars, H and h', and the valve, a, I claim the inclines, J and J', constructed and operating substantially as and for the purpose described.

61,426.—Revolving Sluice for Saving Metals.—T. D. and W. A. Hedger, Meadow Lake, Cal.

We claim a sluice with revolving belt, D, so constructed that the sides will form flexible joints, b b, in passing around the drums, closing up and forming close joints while passing and down the incline, forming a sufficient channel between them for the purpose described, substantially as set forth.

Second, The mouthpiece or opening, G, beneath the platform, so that the sand or pulp which is fed to the machine may enter a sufficient distance below to give the action and force to the water introduced through the opening, G, to sweep down the incline and carry with it the sand and debris, substantially as described, and for the purpose set forth.

Third, Separating the ore passing the valuable portions, up the incline, and the debris down to the foot, as waste matter, as described.

61,427.—Composition for Roofing.—Cyrus Hill, Dover, Maine.

I claim the composition for covering roofs, and for similar purposes, consisting of the ingredients herein named, and united in the proportions substantially as set forth.

61,428.—Corn Husker.—Joseph Hindman, Olathe, Kansas.

I claim a corn husker having the tang, B, turned back and pointing toward the wrist, as herein shown and described.

61,429.—Bench Vise.—John S. Hoar, West Acton, Mass.

I claim the adjustable jaw, B, made as described I also claim its combination and arrangement with the vise jaw.

I also claim the arrangement and combination of the slotted hook, C, and its set screw, b, with the vise jaw, A, and with the adjustable jaw, B, made as described.

61,430.—Muff.—Charles Hollwede and Julius Brzezinsky, New York City.

A fur muff having its ends turned and set upon a former, by means substantially as shown and described,

61,431.—Seed Planter.—D. S. Holman, Conneautville, Pa.

I claim the two seed slides, H H', placed one above the other at the upper part of the tubes, G, and having springs, d, bearing against them, in combination with the wheels, I, and projections, e, having pins, f g, in their peripheries all arranged to operate substantially in the manner as and for the purpose set forth.

Second, The regulating slides, J, in combination with the seed slides, H H, arranged substantially as and for the purpose specified.

Third, The combination of the metallic tubes, L, and covering shares, O, all arranged and applied so as to be capable of operating and being adjusted substantially as shown and described.

61,432.—Burner for Vapor Stoves.—R. L. Howell (assignor to himself, E. M. Wilkins and W. S. Browning), Baltimore, Md.

First, I claim the residuum chamber, N N, and the pipe, B, arranged substantially as described, in combination with a vapor stove.

Second, The conical headed pin, H, within the aperture, J, of the retort, operated by the screw plug, E, substantially as and for the purpose specified.

Third, The retort, F having stands, L, and partition, K, cast solid therewith, the latter having vent, J, extending through it, and valve seat, I, on its side, as and for the purpose specified.

61,433.—Window Sash and Fastener.—Anthony Iske, Lancaster, Pa.

I claim the tongue and groove connection of the strip, B, with the sides, A of the sash, in combination with the turning button, for either locking both parts, A B, together, so as to move up and down jointly, or for locking both to the casing, the whole arranged and operating in the manner and for the purpose specified.

61,434.—Steamboat Signal Apparatus.—Patrick Kenny, New York City.

First, I claim the combination of the signal handles with each other in the manner described, so that each signal handle will have a different line of movement, as and for the purposes set forth.

Second, Attaching the connecting-cords to the index shaft at intervals proportioned and corresponding to the intervals between the signal marks upon the dial, substantially as described.

Third, the combination of one or more levers, G, or their equivalents, with the index shaft, substantially as described.

61,435.—Apparatus for Tethering Animals.—Daniel Kidder, Franklin, N. H.

I claim the spring, E, applied to the pole, D, in combination with the stake A, substantially as and for the purpose described.

61,436.—Churn.—Norman S. Kinyon, Chenango Forks, N. Y.

I claim the combination, construction and arrangement of the dasher blades or floats, with the angular blades, s s, on the lower end of the shaft, B, substantially as described and for the purpose set forth.

61,437.—Railroad Switch.—George T. Lape and Jephthah Leathe, New York City.

We claim the street car replacer, consisting of the side pieces, B B, groove A, lug, a, when constructed and operating as herein set forth for the purpose specified.

61,438.—Cotton Chopper and Thinner.—David P. Lewis, Huntsville, Ala.

I claim a machine for cutting and thinning cotton and for other purposes, constructed, arranged and combined substantially as herein shown and described.

61,439.—Stop Motion for Looms.—Alphonse Julien Loiseau, New York City.

I claim the oscillating plate, F, and cross bar, E, in combination with weights or rods, a, dog, e, catch bar, N, and stop, K, constructed and operating substantially as and for the purpose described.

61,440.—Attachment for Holding Skirts Together.—Emile Loiseau, New York City.

I claim a strap, A, whereby a lady's hoop skirt is attached to a petticoat saidstrap being made substantially as herein shown and described,

61,441.—Balance Slide Valve.—Isaac V. Lynn and George I. Snowden, Pittsburgh, Pa.

I claim the packing ring, D, or its equivalent, when used in combination with the cylinders, f and C, plate, B, and valve, A, constructed, arranged and operating substantially as herein described, and for the purpose set forth.

61,442.—Wood Turning Lathe.—John McMichael (assignor to Joseph Wright), Philadelphia, Pa.

First, I claim the rocking frame, H, arranged with the cutters, G and G', and the standing frame, A, substantially as hereinbefore described, and for the purposes specified.

Second, Combining the cam, V, with the rocking shaft, T, and rocking frame, H, for giving a reciprocating motion to the latter, substantially as and for the purpose above described.

Third, The combination of the cam-lever, O', with the centre, O', and lever, P, the latter being operated by the lever, Q, or its equivalent, substantially as and for the purpose set forth.

Fourth, arranging the sliding handle, Y, and spring, X, with the upright W, for the double purpose of giving a rocking motion to the frame, H, by means of the cam, V, and actuating the cam lever, O', through the intermediate levers, P Q, substantially as described and for the purposes specified.

61,443.—Caloric Radiator for Stove Pipes.—Benjamin F. Miller, New York City.

First, I claim the septa or plates, f, in combination with the diaphragm, e and radiating case, c d, substantially as and for the purposes set forth.

Second, I claim arranging the diaphragm, e, and case, c, in the manner shown in Figs. 1 and 3, so that the space through which the heated gases or products of combustion pass shall be nearly of equal area to the pipe, a, for the purposes and as set forth.

61,444.—Copy Holder.—Charles B. Moseley and Lucius L. Woolley, Medford, Mass.

We claim the cylinder, D, or its equivalent, having a spring jaw, F, when hung in a suitable frame, substantially as and for the purpose described.

We also claim, in combination with the above, the swinging lid, H, arranged substantially as described, and for the purpose specified.

We also claim the notched head of the cylinder, D, or its equivalent, in combination with the pawl or catch, N, for the purpose described.

We also claim the iron frame on which the working portion of the machine rests, and which holds the same in position, substantially as specified.

61,445.—Railway Chair.—Michael C. Murray, West Acton, Mass.

I claim the improved chair as constructed with the base plate, A, separate from and to extend under and support the jaw, C, as having the rebate, a, and as provided with the projections, c c', and the shoulders, b b, arranged with respect to the base plate, A, and the jaws, B C, and so as to intend into and under the rails, as specified.

I also claim the rails as made with the notches, d d, arranged in them at their joints or ends as specified and to be used with the chair made as explained.

I also claim the nut holder, d, as made with the nut recesses, i i, and the flanges, k, or their equivalents.

61,446.—Broom.—Henry E. Newton (assignor to himself and W. A. Newton), Manchester, N. H.

I claim one or more springs, B, which connect the handle, C, with the broom head, A, substantially in the manner and for the purpose herein shown and described.

61,447.—Pumps.—John Nicholson, Allegheny City, Pa.

I claim providing the upper end of the valve chamber or working barrel, h, of a pump with a lock, f f', furnished with catches, g, and springs, e, said lock being used in connection with a coupling, A, case, C, seat, J, nuts, k, 8 and 9, spiral spring, r, and rollers, v', on the pump rod, D, the whole being constructed, arranged and operating substantially as herein described and for the purpose set forth.

61,448.—Brick Kiln.—L. R. Norman, and W. F. Dieterichs, Jr., St. Louis, Mo.

We claim, First, The construction and arrangement of the smoke flues, D d D', as described and set forth.

Second, We claim the cold air or supply chambers, C, with the distribution of the air to the furnaces through a series of orfices, c, as described and set forth.

Third, We claim the construction of the vertical walls of the kiln, with concave sides so as to resist the entire pressure from the expansive force of the heat and steam.

61,449.—Brick Kiln.—L. R. Norman and W. F. Dieterichs, Jr., St. Louis, Mo.

We claim, First, Constructing the sides of our improved brick kiln of double walls to enclose a hot air chamber when the outer wall is inwardly curved or arched, the inner wall being straight, all substantially in the manner described and for the purpose set forth.

Third, We claim also the arrangement of a hot air chamber, D, over the cold air supply chamber, B, between the fire spaces of our improved kiln constructed and operating substantially in the manner and for the purpose herein specified.

Third, The combination and arrangement of the outer chimneys, F, the valves, F' and the air chambers, A2 and D, enclosing the kiln, all substantially in the manner and for the purpose herein set forth.

Fourth, We claim also the arrangement of the fire boxes with grate bars extending entirely across our improved kiln, substantially or herein set forth.

61,450.—Cultivator.—C. P. Norton, Roseville, Ill.

First, I claim the pole, B, arch, C, and supporting wheels, D D, constructed and arranged substantially as and for the purpose herein set forth.

Third, I claim the pole, B b, fig. 1, sliding box, f, loop, F, and set screw, k, in connection with the plough beam, A, all arranged and operating as and for the purpose described.

61,451.—Hat Body.—Julius A. Pease, New York City.

I claim a hat or hat body made from raw or untanned hide, substantially as before described.

61,452.—Cot or Covering for Rolls for Spinning, etc.—Edward L. Perry, New York City.

I claim a cot or covering for rolls of spinning or other machines when made or composed of three or more separate layers or thicknesses joined together of which the outer layers, a and b, consist of leather and the intermediate layer, c, of fibrous or elastic material, substantially as described.

61,453.—Oil Tank.—H. Pierce and J. C. Button, Cleveland, Ohio.

We claim, First, The arrangement of the sills, B, keys, C, abutment brace F, in combination with the foundation floor, G, for the purpose set forth.

Second, The construction and arrangement of the bottom, C', placed within the tank, the interlayer, d', in combination with the tank, H angle irons, b, and floor, G, for the purpose and in the manner set forth.

© 1867 SCIENTIFIC AMERICAN, INC.

61,454.—COMBINED LAMP, COFFEE POT AND BOILER.—Luke A. Plumb, Biddeford, Me.

I claim, First, The tube, D, attached to a cone, C, of the burner of the lamp when used in connection with a vessel provided with a central draft tube to fit over said tube, D, substantially as and for the purpose herein set forth.

Second, The employment or use in a vessel provided with a central draft tube for a lamp of a vessel, E, provided with two or more removable chambers, J, substantially as and for the purpose specified.

Third, The combination with a lamp of two or more vessels, E H, provided with central draft tubes arranged so that the draft tube of one vessel will extend above its top to admit of the lower end of the tube of the other vessel being fitted upon it, substantially as and for the purpose set forth.

61,455.—CARRIAGE JACK.—Oscar T. Potter, Scott, N. Y.

I claim the arrangement of the arm, b, with its fork, d, and crooked lever, m, in combination with the standard, a, when used as and for the purpose set forth.

61,456.—CARTRIDGE FILLING MACHINE.—Timothy J. Powers (assignor to Fitch and Van Vechten), New York City.

I claim, First, The spring or contractible crimping die or device for closing the mouths of the shells on to or in the bullet, constructed to operate substantially as described.

Second, I further claim said contractible crimping die or its equivalent in combination with an intermittent shell carrier for operation together, as essentially as herein set forth.

Third, The combination of an automatic bullet feeder, with an automatic shell carrier, substantially as specified.

Fourth, The combination of an automatic shell feeder, shell carrier, and bullet feeder for action, together as herein set forth.

Fifth, The combination with an automatic bullet feeder of a bullet, take up or slide to deposit the bullet over the shell.

Sixth, In combination with an automatic bullet feeder, a divided or opening and closing conducting die to guide the bullet to its place in or over the shell and to hold it while the charge is being rammed, substantially as specified.

Seventh, Providing the bottom of the powder hopper or space intervening between it and the charge measurer or distributor, with an independent bush and rubber packing, or their equivalents for operation together and in combination with the distributor, essentially as and for the purpose herein set forth.

Eighth, Griping the shell, while being crimped by an independent slide or its equivalent arranged to close upon the mouths of the shell chambers in the carrier and afterwards and retire therefrom, essentially as specified.

Ninth, The combination in one machine of an automatic shell carrier bullet feeder, powder charger or measurer and distributor and crimping device or die for operation together, substantially as herein set forth.

Tenth, While not claiming irrespective of the mode herein described raising the shell at certain points within its chamber in the carrier, I do claim in combination with an intermitting rotating carrier provided with chambers, substantially as described the lifting rod, i, arranged to raise during a pause in the motion of the carrier the shell further up within its chamber, and then to retreat, essentially as and for the purpose herein set forth.

Eleventh, Also elevating the upper end of the shell, prior to crimping above the top surface of the carrier and retaining it there while crimping by means of an intermittently reciprocating rod, e, arranged to operate in connection with the carrier and suitable crimping device, substantially as specified.

61,457.—VISE.—James S. Ralston, Indiana, Pa.

I claim in combination with the A A', of a vise, the cam disks, C C, placed on a coupling rod, B, for opening and closing the jaws to be held to their work by the ratchet wheel, c, and spring dog, e, constructed and operating substantially as herein described.

61,458.—BUTT HINGE.—Andrew Remkin, Philadelphia, Pa.

I claim the roller, m, adapted to the two plates of a lift off hinge, substantially in the manner and for the purpose herein set forth.

61,459.—GLOBE CLOCK.—Smith E. G. Rawson, Saratoga Springs, N. Y.

I claim, First, Providing for the winding up of a globe clock through an aperture in the shaft or axle of rotation of the globe within which the clock is contained.

Second, Having the winding up shaft of a globe clock coincident with the axis of rotation of the globe within which the clock mechanism is contained.

Third, Sustaining a globe clock upon an adjustable support, C, or its equivalent, substantially as described.

Fourth, Supporting a globe clock by means of a vertical spindle upon a pedestal in such manner that the globe can be rotated about a vertical axis, substantially as described.

Fifth, The combination of a fixed index, k, and movable index, n, with a globe which is rotated automatically, substantially as described.

Sixth, Sustaining a globe which is rotated by means of clockwork upon a tubular shaft, in such a manner that the clock spring can be wound up without detaching the sections of the globe, substantially as described.

61,460.—DENTAL PLUNGER.—William G. Redman, Louisville, Ky.

First, I claim the casing as represented in form by A and A', containing the bar, D D', the let-off bar, f, the spiral spring, h, the spring and stop, z and z', the disks, V and V', the partial disk or joint piece, w, and the swivel joint, E, constructed substantially as described for the purpose specified.

Second, I claim the arm or lever, C, connected with the spring helve by slot and bolt, substantially as described.

Third, I claim the spring helve, b, and its connection with the case at 11, and also the spring, d, acting against the helve.

61,461.—CAR TRUCK.—J. W. Reynolds, Hyde Park, Pa., assignor to himself and S. H. Cutler.

I claim, First, The construction and arrangement of the pivot or king bolt, D, of the truck on a socket, C, applied to the cross bar, B, substantially as and for the purpose set forth.

Second, The combination and arrangement of the springs, I, bars, G, and the boxes, F, substantially as and for the purpose specified.

Third, The openings, d, in the outer sides of the boxes, F, in combination with the slides, e, substantially as and for the purpose set forth.

61,462.—VALVE GEAR FOR DIRECT-ACTING ENGINES.—M. S. Richardson and Erasmus A. Pond, Portland, Vt.

We claim, First, The piston valves connected with and directly actuated by a system of levers operated by the steam piston as herein described, so as to effect the induction and eduction of steam to and from the steam cylinder

Second, The combination of the piston valves with an oscillating lever actuated by auxiliary levers arranged within the steam chest and cylinder, substantially as shown and set forth.

Third, The combination with a system of levers located within the steam chest and cylinder and actuated by the steam piston as described of the cylindrical plungers or piston valves sliding in recesses formed in the steam chest on each side of the central steam admission and exhaust chambers, substantially as herein shown and specified.

61,463.—EXTRACTING OIL FROM SEEDS.—John Robertson, Brooklyn, N. Y., assignor to himself and Abraham Barthholf.

I claim, First, The process substantially as herein described of treating seeds or other substances for the extraction of oil by subjecting the same to the action of beaters in a heated cylinder or case, essentially as herein set forth.

Second, The within-described process of extracting the oil from seeds or other substances reduced to a pulp by exposing the same to the action of a centrifugal machine, substantially as specified.

Third, The combination with a centrifugal machine of revolving beaters working in a cylinder or case as described and to which steam is or may be admitted for separate or joint action on the material from which the oil is to be extracted, essentially as specified.

Fourth, The arrangement in a loose or detachable manner within the revolving cylinder or holder of a centrifugal machine and so as to rotate with said holder of the reticulated cylinder or screen in which the material is placed for action, as described.

61,464.—PEAT MACHINE.—Almon Robertson, McLean, N. Y.

First, I claim the carriage molds, a a, arranged relatively to each other and to the grinding and depositing mechanism, D1 D2, or their equivalents, substantially as and for the purpose herein set forth.

Second, I claim the presser, G, in combination with the carrier molds, a a, and arranged to operate relatively, substantially as herein specified.

Third, I claim the slack cloth, g, arranged on the presser, G, so as to be pulled off by a motion commencing at the edge or edges, as represented and described for the purpose herein specified.

Fourth, I claim the slack cloth, M, arranged as herein shown relatively to the section of molds, a a, so as to unfold, peel off and expel, in the manner and with the effect substantially as herein specified.

Fifth, I claim the roller, I, arranged to pass into and out of the several molds and replace the slack cloth, M, or its equivalent, in the manner herein shown.

61,465.—AMALGAMATOR.—Juan A. Robinson, Jr., San Francisco, Cal.

I claim an amalgamator constructed of copper and wood or an alloy of copper with frictional surfaces, substantially as and for the purposes described,

61,466.—MANUFACTURE OF SOAP.—George W. Rogers, Lancaster, N. Y., assignor to himself and John D. Shepard.

I claim the within-described manufacture of soap by subjecting the material to a high pressure at a moderate temperature, substantially as and for the purpose herein specified.

61,467.—CARPET SACK.—Adaline Rose, Bath, N. Y.

I claim the carpet sack, A, with the straps, B, and buckles, and with the keepers, C, as and for the purpose specified.

61,468.—PUMP.—John Ross, Greenville, Mich.

First, I claim the arrangement of the bore B, bores, F F, chamber, C, chambers, L M, and piston rods, P R, secured to racks, S T, in combination with the stock, A, and valve cylinders, H I, and operating substantially as described for the purpose specified.

Second, In combination therewith the vent tube, X, of the chamber, C, and notched rod, A', arranged to operate substantially as and for the purpose specified.

61,469.—MODE OF MOUNTING PHOTOGRAPHS FOR EXHIBITION.—Isaac Rowell and Francis E. Mills, San Francisco, Cal.

First, We claim arranging or mounting photograph likenesses on a plane divergent from the plane of the background and foreground, substantially as and for the purposes herein set forth.

Second, We claim the picture frame or case, A, with the sloping back for holding the background and likeness on separate and divergent planes, substantially as and for the purpose described.

Third, The combination of parallel wheels revolving independently around the same axis, for the purpose of changing the grouping and scenery of the picture, and bringing different figures in juxtapositioh successively, substantially as set forth.

16,470.—PLOUGH.—Israel Long, Terre Haute, Ind.

First, I claim the adjustable beams, F F, occupying positions at opposite sides of the machine and outside of the wheels, and each adapted for the attachment of one or more ploughs, substantially as and for the purpose herein specified.

Second, I claim the combination with the ploughs, G G', beams, F F, of the collars, E E, fitted to turn upon the ends of the axle, and adjusted by means of levers or otherwise, as and for the purpose specified.

Third, I claim the combination of the plough beams, F F, collars, E E, levers, H, and notched bars, I I, all arranged and operating in the manner and for the purpose herein set forth.

Fourth, I claim the adjustable double-tree, K, in combination with the independent hounds, D D', whereby the draft may be transferred to either side of the machine, substantially as and for the purpose described.

61,471.—MACHINE FOR SEPARATING IRON FROM SAND.—George H. Sanborn, Boston, Mass.

I claim the use of the cylinder, B, when provided with the magnets, g g g, one or more rows arranged substantially as and for the purposes described, in combination with the brush, C, the hopper, D, the spout, E, the trough, F, and the drawer, J, substantially as and for the purposes set forth.

61,472.—EMBALMING BODIES.—George W. Scollay, St. Louis, Mo.

First, I claim embalming dead bodies or preserving them from putrefaction, by introducing an antiseptic gas or gases into the arterial or vascular system, substantially as described.

Second, Embalming dead bodies or preserving them from putrefaction by the introduction of an antiseptic gas or gases into the bowels, stomach, or lungs, substantially as set forth.

Third, Embalming dead bodies or preserving them from putrefaction by combining the internal and external application of the gases thereto, substantially in the manner described.

61,473.—CLOTHES DRYER.—John Seeman and Silas P. Catrow, Middletown, Ohio.

We claim, in combination with the hinged frames, B, the frame, E, hung thereto and locking together, substantially as described for the purpose specified.

61,474.—PETROLEUM STILL.—John S. Shapter, New York City.

First, I claim the arrangement of the boiler superheated and still, by which the heat from the boiler is made to pass through the superheated, and then through under and around the still.

Second, The arrangement of the furnaces, L L, collar, C, and dampers, N N N N, in combination with the coil, F, for superheated steam within the still.

Third, Inclosing a petroleum still in brick work with two side channels, one above and the other below the collar, c, and a third beneath the still, substantially in the manner and for the purpose described.

Fourth, Placing the eyeglass, Q, in a tube connected with the still, so that the operation within the still can be seen, although enclosed in brick walls with channels for smoke and hot air between the masonry and the still.

Fifth, The air pipe, S, when applied to a petroleum still for regulating the vacuum.

61,475.—RAILROAD SWITCH.—Benjamin Shiverick and Thos. L. Calkins, Philadelphia, Pa.

First, We claim the switch lever, I, contained within a building or inclosure, and arranged in respect to the door of the same substantially as set forth.

Second, The combination and arrangement of the frog rails, D and D', and switch rails, E and E', the bar, H, with inclinations, x and y, yielding plates, G and J, and rods, F and K, the whole being arranged for joint action, substantially as and for the purpose herein set forth.

61,476.—CRANBERRY GATHERER.—George Shove, Yarmouthport, Mass.

I claim the combination as well as the arrangement of the guard wires or guards, c c, with the inclined comb or series of wires, b b b.

I also claim the combination as well as the arrangement of the guards, c, the inclined comb and the trough, B.

I also claim the combination as well as the arrangement of the side plates, a a, the comb, b b b, the guards, c c, and the trough, B, the whole being substantially as hereinbefore explained.

61,477.—BUCKLE.—Earl A. Smith, Waterbury, Conn.

I claim the combination of the bow part, Fig. 4, with the lever part, Fig. 3, when they are constructed, connected and fitted for use substantially as herein described and set forth.

61,478.—GRIDDLE OR COOKING UTENSIL.—E. J. Smith, Washington, D. C.

I claim as a new article of manufacture the cooking utensil herein described, composed of plates, B B', removable rests, a a, and support, A, substantially as and for the purpose set forth.

61,479.—TRANSPLANTING TRAY.—Wm. W. Smith, Montrose, Pa.

I claim a plant tray constructed substantially as described for the propogation and growth of plants and flowers, as herein set forth.

61,480.—MACHINE FOR COMBING AND ASSORTING BRISTLES.—Nathan H. Spafford, Baltimore, Md.

First, I claim the endless apron and feed roller, E e, with the picker, E', on the shaft, F, having a continuous motion as described, in combination with the intermitting endless apron and feed roller, E' e', operated substantially as herein set forth, for the purpose described.

Second, The comb, J, with its appurtenances, consisting of the comb stock and teeth stem, J', gage plate, K, arms, K', and spring, l, all combined substantially as and for the purpose set forth.

Third, The manner of operating the comb, J, by means of the shaft, g, and crank wrist, I, in combination with the sliding stem, J', and its socket and with the adjustable joint, K, and cams, m m, substantially as set forth: and this I claim whether the intermittent motion of the comb be derived from the action of the segment, H, in the pinion, h, or from any equivalent device,

Fourth, The comb, J, and its appurtenances, in combination with the gage plate, M, operated by means of the rock shaft, L, stud, n, and toe, n', or their equivalents, substantially as and for the purpose hereinbefore set forth.

Fifth, The jaws, O, furnished with one or two yielding lips, and the levers, O" O", in combination with the cams, R, and springs, s, and either with or without the toggle-joint levers, q q, all combined with and operating by means of the windlass, P', and chains or any equivalent device, substantially as and for the purpose set forth.

Sixth, The dogs, u u, on the shaft, t", in combination with and operated by the tumbler, t, slotted bar, t', and lever, y, or its equivalent, substantially in the manner and for the purpose described.

Seventh, The endless platform, u u, arranged substantially as described, and having an intermittent motion in combination with the endless apron, W, over the deposit box, W, for the purpose set forth.

Eighth, The sweeping fingers, x' x', operating as set forth, and by means substantially as described, in combination with the moving platform, w w.

Ninth, I claim the cam, Y, rods, y y, and studs, y' y', when combined substantially as herein described, for the purpose of giving a tremulous lateral movement to the sides of the box, W, for the object set forth.

Tenth, I claim the combination of the jaws, o, with the comb, J, and the endless apron and teed roller, E' e', each with their several appurtenances arranged and operating substantially as and for the purpose set forth.

61,481.—STREET CAR.—John Stephenson, New York City.

First, I claim the pedestals, B, formed or provided with pendant jaws, a a, in combination with springs, D, located at each side of the axle box, and applied or arranged in such a manner as to admit of an universal motion or pendulous vibration of the car body, substantially as shown and described.

Second, The inverted T, connecting the lower ends of the jaws, a a, of the pedestals and arranged or applied in relation to the axle boxes, substantially as and for the purpose set forth.

Third, The truck, M, constructed with its horizontal side bars not under the springs or pendants, but at the sides thereof, and free therefrom, and connected with the axle boxes, C, or the housings, G, by means of the arms, N, substantially as described.

Fourth, The yoke, or housing, G, with one or both of the arms as described and applied to the axle boxes, C, either with or without the elastic substance, b*, substantially as and for the purpose specified.

Fifth, The clog arms, N and O, both or either of them connected with the axle boxes, or with the yokes or housings, G, substantially as and for the purpose specified.

61,482.—ROOF FOR RAILROAD CAR.—John Stephenson, New York City.

First, I claim the canopy, D, for the covering of the platforms of cars constructed separately from the roof and body of the car, and attached thereto substantially as and for the purpose specified.

Second, The smaller canopy or "frontlet," F, applied to the ends of the car roof, A, over the end ventilators, c, substantially as and for the purpose set forth.

61,483.—SOUNDING BOARD FOR PIANOS.—F. Strothmann, Louisville, Ky., assignor to Peters, Webb & Co.

I claim the improvements in sounding board for pianofortes and other musical instruments herein specified, the same consisting in separating or dividing the board, substantially as and for the purpose specified.

61,484.—CAN OPENER.—Sinius E. Totten, Brooklyn, N. Y., assignor to himself and C. L. Topliff.

I claim a tool, A, provided with a sharp edged end, c, from which projects a pointed tooth, d, substantially as and for the purpose described.

61,485.—CORK SCREW.—William H. Van Gieson, Passaic, N. J.

First, I claim constructing the upper part, B, of the stem, in the form of a twist, spiral or screw, turned in a direction the reverse of that of the lower part, A, substantially as and for the purpose set forth.

Second, The combination with the stem, A B, constructed substantially as described, of the tube, E, plate, H, or its equivalent, spring catch, I, and handle, F, the whole working together in the manner and to accomplish the result set forth.

61,486.—MACHINE FOR CUTTING TILES.—Charles Vogel, New York City.

First, I claim the sliding carriage, D, for the file blank, arranged to move forward and backward upon the bed piece, A, or its equivalent, when operated through a driving shaft, O, gears, P 2, and Q shaft, R, having ratchet wheel, S, with which engages a pawl, T, that is operated through a pitman rod, V, hung to an adjustable arm, W, of the crank arm, Y, at one end of the shaft, Z, substantially as and for the purpose described.

Second, The combination with the file bed, or block, of the notched plate, K, for receiving the tang of the file, and side clutches or jaws, L or M, each arranged and applied to the said block, so as to be operated substantially as and for the purpose described.

Third, The springs, O 2, constructed and arranged as described in combination with the lifting beam, D 2, and eccentric or cam pulleys, T 2, substantially as and for the purpose described.

Fourth, The combination with one or more of the springs, O 2, of the lifting arm, W 2, arranged with regard to the same as and for the purpose specified.

Fifth, The arm, f 4, attached to file carriage, D, in combination with the lever, g 4, connection rod, h 4' catch, l 4, and m 4, and notched arm, c 4, of the beam shaft, O 3, when all arranged and connected together so as to be operated by the arm, f 4, substantially as described, and for the purpose specified.

61,487.—BOOT OR SHOE.—Rudolph Vollschwitz, New York City.

I claim the combination of a flexible wedge, B, with zig-zag loops, a, attached to the opposite edges of the slit or opening in a shoe or gaiter boot, substantially as and for the purpose described.

61,488.—CORK EXTRACTOR.—James Walker, Cincinnati, Ohio.

First, I claim the arrangement of adjustable guide, E, cylindrical stock, E, collar, I, crank, H, and cam headed lever, J J' K, for the purpose set forth.

Second, The provision, in combination with the above, of the thimbles, I, of equal external but dissimilar interior diameters, as and for the purpose explained.

61,489.—MACHINE FOR CUTTING SOLES.—J. H. Walker, Worcester, Mass.

First, I claim the combination and arrangement of the broad table, D, for supporting the side of leather with the adjustable bed or cutting block, L, and the reciprocating platen, K, substantially as and for the purposes set forth.

Second, The combination and arrangement with the table, D, bed, L, platen, K, and shaft, J, of the peculiarly constructed frame composed of the parts marked E H H', and G, substantially as described.

61,490.—HAND CORN PLANTER.—Lewis Weaver, Canton, Ohio.

I claim the bar, L, in connection with the valve standard, C, and opening, N, substantially in the manner and for the purpose specified,

61,491.—RAILROAD CHAIR.—Geo. Webb, Williamsport, Pa.

First, I claim the joint plate, A, resting on the ties, C, in combination with the flanged clamp, D, and rail, B, constructed and secured in the manner as and for the purpose specified.

Second, The combination of the joint plate, A, flanged clamp, D, gibs, d, split keys, e, as and for the purpose specified.

61,492.—PUMP.—J. R. Weisiger, Danville, Ky.

I claim the pump cylinder or tube, A, provided with a piston, B, partition plate, D, and valve, G, in combination with the tubes, H J L, having valves, I K M respectively, when all arranged with regard to each other so as to operate substantially in the manner and for the purpose described.

61,493.—PEAT CAR.—Thomas J. Wells, St. Anthony, Minn.

I claim a car for transporting and drying peat, constructed with a series of frames, arranged substantially in the manner as herein shown and described.

61,494.—CHURN AND EGG BEATER COMBINED.—George C. Westover, Paducah, Ky.

I claim the construction and combination of the churn, with its devices, G H I J L M, as herein described and for the purposes set forth.

61,495.—LIME KILN.—George W. White, Greensburg, Ind.

I claim the horizontal taper lime kiln, A, when constructed as described, and provided with the doors, b, and dividing perforated partition, C, in the manner and for the purposes set forth.

61,496.—WASHING MACHINE.—Isaac Whitney, Dayton, Ohio.

First, I claim the hinged soaping box, l, with its bars, n n, and removable trough, L, adapted to contain either bar, or soft soap, substantially as described.

Second, The combination of the brush roller, F, with the corrugated wooden roller, E, substantially as described.

Third, In combination with the brush roller, F, and corrugated wooden roller, E, I claim the treadle, k, substantially as and for the purpose set forth.

Fourth, The arms, C, operating independently of each other by means of the elastic bands, D D, in combination with the corrugated roller, E, in the manner and for the purposes described.

Fifth, The combination of the corrugated wooden roller, E, brush roller, F, treadle, k, gear wheels, H c, arms, C, spring, D, and soaping cover, I, and trough, K and L, substantially as and for the purposes set forth.

61,497.—WINDOW FASTENER.—L. C. Wing, Concord, Mass., and A. R. Bradeen, Waterborough, Me.

We claim an improved window blind fastener, formed by the combination of the arm, A, bars, B and C, perforated plate, D, and spring bolt, E, with each other, substantially as herein shown and described and for the purpose set forth.

61,498.—CLOTHES DRYER.—Leonard Wordworth, Morrison, Ill.

I claim the braces, D.D, in combination with the standards, A A B B B B, and bars, e e e e, substantially as and for the purpose set forth.

61,499.—TOOL FOR CUTTING OFF BOILER TUBES.—Nathan Wright, Jersey City, N. J.

I claim a tool for cutting off boiler and other tubes, constructed substantially as described, or in any other equivalent manner, so that a thrusting cut is given to the tool, and whereby the same action that thrusts the cutter through the tube also serves to complete the operation of severing the same by a draw cut, essentially as specified.

61,500.—LIFE BOAT.—William H. Wylly, Savannah, Ga.

I claim the boat consisting of the gutta percha or elastic sides, A B, keel, C', copper covering, b, flexible tube, c, force pumps, D, bars, I, seats, J, supporting bars, f f', rudder, D', when all are constructed and arranged as herein set forth and for the purpose specified.

REISSUES.

2,463.—SEALING FRUIT JARS.—Wm. H. Lyman, Boston, Mass., assignee by mesne assignments of Elbridge Harris. Patented Feb. 9, 1864.

First, I claim forming a groove or depression in or around the neck of a can, for the retention of an elastic ring or band impervious to air, substantially as and for the purpose described.

Second, The employment of an elastic ring or band when used between the rim of a cover and the neck of a can, substantially as and for the purpose described.

Third, I claim as a new article of manufacture, fruit jars composed of the rim cap, G G', elastic ring or band, D, and jar or can, D, substantially as and for the purpose described.

Fourth, I claim the rebate formation, C, in combination with the elastic band, B, and the flange, G' substantially as and for the purpose described.

2,464.—HARVESTER RAKE.—Adam R. Reese, Phillipsburg, N. J. Patented Feb. 16, 1864.

First, In a floating beam harvester I claim a rake standard rigidly attached to and vibrating with the platform and supporting the rake shaft between the driving wheels.

Second, I claim the combination of radial rake arms pivoted between the vertical rake shaft and the rake head, and a guide located between the rake shaft and the pivot.

Third, The combination of revolving rake and reel arms with a camway between two parallel cams, for the purpose of keeping the rake and reel arms firmly in position while revolving.

Fourth, The combination of a hinged platform, a support of the revolving rake rigidly attached to and moving with the said platform or finger beam and radial pivoted rake arms.

Fifth, the combination of the rake shaft, K, with the driving shaft, o, by means of the endless chain, M, when arranged and operating substantially in the manner described, for the purpose of driving the rake in any position of its shaft without the intervention of gearing, as set forth.

2,465.—HARVESTER RAKE.—Adam R. Reese, Phillipsburg, N. J. Patented May 1, 1866.

I claim, First, In a harvester having a hinged cutting apparatus, the combination of a revolving rake and reel attached to and vibrating with the platform of said harvester, and a driver's seat located upon the main frame, the whole so arranged and operating that the rakes shall not revolve over the driver.

Second, The combination of a hinged cutting apparatus, a driver's seat on the main frame, and hinged radial rake or reel arms.

Third, The combination of the finger beam and main frame with the tubular X-shaped frame, G G', as described, for the purpose of supporting and bracing the rake shaft.

Fourth, The combination of a revolving rake and reel attached to and moving with the platform of a hinged finger beam machine and endless chain and shives having pockets or cells, whereby the revolving rake and reel can be driven while it is free to rise and fall with the platform.

Fifth, The combination of an endless driving chain, a pulley on the main shaft, a corresponding pulley on the vertical or nearly vertical revolving reel and rake shaft mounted on the finger beam or its extension and the intermediate guide for guiding the chain, between the main shaft and rake shaft.

DESIGNS.

2,560.—COAL SHOVEL.—Samuel W. Gibbs, Albany, N. Y.

2,561.—TRADE MARK.—August Heidelberger, New York City.

2,562 and 2,563.—CLOCK CASE.—Nicholas Muller New York City.

2,564 and 2,565.—CASTER FRAME.—Horace C. Wilcox (assignor to the Meriden Britannia Company), West Meriden, Conn.

NOTE.—In the above list of patents we recognize FORTY-SEVEN cases which were prepared at this office.—EDS.

© 1867 SCIENTIFIC AMERICAN, INC.

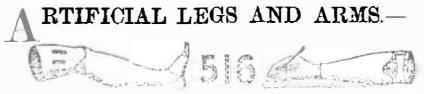
Advertisements.

The value of the Scientific American *as an advertising medium cannot be over-estimated. Its circulation is ten times greater than that of any similar journal now published. It goes into all the States and Territories, and is read in all the principal libraries and reading rooms of the world. We invite the attention of those who wish to make their business known to the annexed rates. A business man wants something more than to see his advertisement in a printed newspaper. He wants circulation. If it is worth 25 cents per line to advertise in a paper of three thousand circulation, it is worth $2.50 per line to advertise in one of thirty thousand.*

RATES OF ADVERTISING.

Back Page.....75 *cents a line.*
Back Page (with engraving).....$1.00 *a line.*
Inside Page.....40 *cents a line.*
Inside Page (with engraving)....60 *cents a line.*

ARTIFICIAL LEGS AND ARMS.—



ESTABLISHED 27 YEARS.
Send for Pamphlet. WM. SELPHO & SON,
5 2] 516 Broadway, New York.

SAVE YOUR FILES.— BORTHWICK'S UNIVERSAL SAW SHARPENER. Circular and Mill Saws sharpened in one-fifth the time taken with files. Price $30. Agents wanted. For further information address J. BORTHWICK,
6 2*] 328 Buttonwood street, Philadelphia, Pa.

SPOKE-LATHES, TENONING AND Spoke-Polishing Machinery of approved Patterns manufactured by J. GLEASON,
6 3] 1030 Germantown Avenue, Philadelphia, Pa.

IMPROVED ENGINE LATHES, BORING ENGINES, MILLING MACHINES, Etc. LATHE CHUCKS.
The largest variety of styles and sizes to be found in New England. Tools built in the most thorough manner, at the lowest prices. For illustrated circular address
6 2] L. D. FAY, Worcester, Mass.

FOR SALE—An Engine Lathe, 18 inches Swing. Also, 6 inch Shapers constantly on hand by
6 4*] STOCKMAR & DUVINAGE, 580 Hudson st., N. Y.

ONE HUNDRED DOLLARS Will buy a good, substantial Brick Machine, of the Clay-tempering kind, which is warranted to make 15,000 Brick per day, of a better quality than by hand. Apply to
6 4] PREY SHECKLER & CO., Bucyrus, Ohio.

GOOD BOOKS FOR AGENTS.— Works on Oratory, Memory, Self-Education, Home Improvement, Good Behavior, Writing, Speaking, Character Reading, and on the Natural Sciences. Send stamp for Catalogues and Terms to FOWLER & WELLS,
6 4] 389 Broadway, New York.

BARTLETT'S NEEDLE FACTORY— Office 569 Broadway, New York. Needles for all kinds of Sewing Machines. The Bartlett Hand Needles, Hackle, Gill Pins, etc., to order. 6 tf

BARTLETT'S SEWING MACHINES.— ☞ A NEW STYLE, for use by Hand or Foot, at $25. Warranted and sent by Express everywhere. Principal office 569 Broadway, New York. 6 tf

HUTCHINSON & LAURENCE, 8 Dey st., Have on hand, and furnish to order, Steam Engines and Boilers, Circular-saw Mills, Cotton Gins, Iron & Wood-working Machinery, Shafting Belting, etc. 6 4

PORTABLE AND STATIONARY Steam Engines and Boilers, Circular Saw Mills, Mill Work, Cotton Gins and Cotton Gin Materials, manufactured by the ALBERTSON & DOUGLASS MACHINE CO., New London, Conn. 6 tf

TO MANUFACTURERS OF TEXTILE FABRICS.—Butcher's Patent Temples, adapted to weaving all kinds of goods; also, Thompson's Patent Oil Cans for oiling Machinery—neat and economical; also, Patent Shuttle Guides which will protect the weaver and save the owner the cost of the guides every year. Furnished by E. D. & G. DRAPER,
6 tf eow] Hopedale, Mass.

THOMAS' PATENT ENGINE LATHES, Worcester, Mass. Western orders for this celebrated Lathe supplied by GREENLEE BROS. & CO., Agents, 52 Dearborn st., Chicago, at Machinery Depot for Iron and Wood-working Machinery, Railroad, Mill, and Machinists' Supplies, etc., etc. 6 6—W.

CONTRACTORS WITH CAPITAL Will learn something to their advantage by addressing the subscriber. None but those with Capital need apply.
FENCH F. TILGHMAN, Ch. Eng. and Supt.
1*] M. and D. R. R., Greensborough, Md.

SPOR'S CHANGE WHEEL TABLES for SCREW CUTTING. Price 25 cents. Sent by mail. An agent wanted in every shop. JOHN W. FRANCIS,
1*] Care of Industrial Works, Philadelphia, Pa.

S. HEALD & SONS, Barre, Mass., build the most accurate Lever-setting Portable Circular Saw Mills. Prices low. Send for Circular. tf 6

IMPORTANT TO MINERS AND WELL DIGGERS.—Proposals will be received at 487 1st Avenue, for boring an Artesian Well.
1*] JOS. M. KOEHLEY.

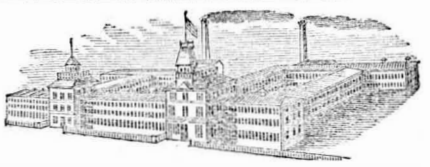
— MACHINERY. —

FOR SALE—Six Double Engines, Boilers, etc., 30-H. P., made in England, first-class work, complete and new. Will be sold at much less than cost.
6 4*] OBER NANSON & CO., 43 Broad street.

PEAT MACHINES OF THE MOST Sim- ple, Compact, and Effective construction, and thoroughly tested, will be furdished by T. G. WELLS, St. Anthony, Minn., or G. W. BROWN, Agent, 4 Broad st., New York. Also, drying facilities. Send for Circular. 1*

FISH BROTHERS, Racine, Wis., Manufacturers of Wagons, Carriages, etc. All work warranted in every particular. 6 4*

TO MANUFACTURERS.— For Sale—an established Coffin Handle and Trimming factory in St. Louis, Mo. Capital required about $10,000. For particulars, address
GALLENBECK & LINK,
6 5*] No. 14 South 9th street, St. Louis, Mo.



ENGINEERS & CONDUCTORS' WATCHES

THE AMERICAN WATCH COMPANY, of Waltham, Mass., request us to publish the following letters, recently received, recommendatory of Waltham Watches for railway use. The Pennsylvania Railroad Company have for several years furnished to their employees watches specially made for them by the Waltham Company, and it is this class of watches the Superintendent, Mr. Williams, refers to. Similar watches (in strong silver or gold cases, with plate-glass crystals,) we are prepared to supply, named and engraved to order; and of them, as being most suitable for the use of Engineers, Conductors, Station-Masters, or Expressmen and Messengers, the Company give the most ample guarantee. It is a remarkable fact that Railroad Companies using our watches suffer much less from collisions and similar accidents than any others.

Any of the grades of Waltham watches may be purchased of Watch Dealers generally throughout the country.

ROBBINS & APPLETON,
182 Broadway, New York.

ROBBINS, APPLETON & CO.,
158 Washington street, Boston.

PENNSYLVANIA RAILROAD CO.

Office of the General Superintendent,
Altoona, Pa., 15th Dec., 1866.

GENTLEMEN:—The Watches manufactured by you have been in use on this Railroad for several years by our Engineemen, to whom we furnish watches as part of our equipment. There are now some three hundred of them carried on our line, and we consider them good and reliable timekeepers. Indeed, I have great satisfaction in saying your watches give us less trouble, and have worn and do wear much longer without repairs, than any watches we have ever had in use on this road. As you are aware, we formerly trusted to those of English manufacture, of acknowledged good reputation, but as a class they never kept time as correctly, nor have they done as good service as yours.

In these statements I am sustained by my predecessor, Mr. Lewis, whose experience extended over a series of years.

Respectfully, EDWARD H. WILLIAMS,
General Superintendent.
American Watch Company, Waltham.

NEW YORK CENTRAL RAILROAD.

Locomotive Department, West Division,
Rochester, Dec. 24, 1866.

GENTLEMEN:—I have no hesitation in saying that I believe the great majority of Locomotive Engineers have found by experience that Waltham Watches are the most satisfactory of any for their uses. They run with the greatest accuracy and steadiness, notwithstanding the rough riding of an engine, and as I have never known one to wear out, they must be durable. I hope to see the time when Railway Companies will generally adopt your watches, and furnish them to all Engineers and Conductors. In my opinion it would greatly tend to promote regularity and safety. Yours respectfully,

CHARLES WILSON, G. Chief Engineer,
B. of Locomotive Engineers.
American Watch Co., Waltham, Mass. 5 2

NATIONAL INVENTORS' EXCHANGE, 208 Broadway, N. Y. City. Branch offices throughout the U. S. Patented Inventions introduced, and Patent Rights bought and sold on Commission. Send stamp for Circular. JAMES B. COIT & CO., Directors. 1*

OUR YOUNG FOLKS Has every month 64 or more large pages full of interesting Stories by such writers as Mrs. Stowe, Mrs. Whitney, Mrs. Childs, Bayard Taylor, Mary N. Prescott, Lucy Larcom, Gail Hamilton,—and these are all copiously illustrated by the best artists in the country. Frequently full-page illustrations are given.
Terms: Two Dollars a year; Single or Specimen Number, 20 cents.
TICKNOR & FIELDS, Publishers, Boston.

EVERY SATURDAY Gives weekly 32 large, double-column, octavo pages filled with the choicest selections from the admirable European Periodicals. These are reprinted with the utmost promptness, frequently from advance sheets and include articles by the best story-tellers and essayists in the world.
Terms:—Single Number, 10 cents; $5 a year.
1] TICKNOR & FIELDS, Publishers, Boston.

WONDERFUL DISCOVERY!—In mak- ing Cider Without Apples. Immense profits realized. A fortune can be made from it at this time when apples are so scarce. An enterprising man can make $5,000 this season without leaving home. To a Western man this knowledge is a fortune in itself. Full directions, with individual rights, sent for 25 cents. Address
6 1—R.] JULIUS RISING, Southwick, Mass.

TO WATCHMAKERS.—Rush's New Im- provement on Depthing Tools—easy put on and the only true Tool to adjust the lever in. No Watchmaker should be without one. Price $3 00, sent by mail. Address A. RUSH,
6 2*] Box 114, Charlton, Iowa.

Burgh on the Slide Valve—Just Ready.

THE SLIDE VALVE PRACTICALLY CONSIDERED. By N. P. Burgh, author of "A Treatise on Sugar Machinery," "Practical Illustrations of Land and Marine Engines," "A Pocket-Book of Practical Rules for Designing Land and Marine Engines, Boilers, etc., etc., etc. Completely illustrated. 12mo.....$2.

CONTENTS:

CHAPTER I.—Antecedents of the Slide Valve and Steam Ports in the Cylinder. II.—The Proportion of Valves and Ports in the Cylinder; Common and Exhaust Relief Slide Valves. III.—Equilibrium and Double-Ported Valves. IV.—The Proper Mode of Obtaining the Correct Amount of Lap. V.—The Effect of Expansion by the Action of the Slide Valve. VI.—The Delineation of the Path of the Crank Pin. VII.—General Observations.

☞ The author has carefully avoided theorizing on the subject on which he treats; all his remarks have been deduced from practical demonstrations—assumptions have not been admitted—therefore the data given will be found correct.

☞ The above, or any of our books, sent by mail, free of postage, on receipt of price.

☞ My new Catalogue, complete to Jan. 1, 1867, sent free of postage to any one who will favor me with his address.

HENRY CAREY BAIRD,
Industrial Publisher,
6 3] 406 Walnut street, Philadelphia.

WROUGHT-IRON WELDED TUBE of all sizes, for Steam, Gas, or Water purposes. Brass work and Iron Fittings of every kind to suit the same; also, PEACE'S Improved Gas-Pipe Screwing and Cutting off Machines, for both Hand and Steam power, to screw and cut off from ⅛ to 4-in. pipe, and all other tools used by Steam and Gas-Fitters. Manufactured and for sale by CAMDEN TUBE WORKS, Second and Stevens streets, Camden, N. J. 6 12*

INSTITUTE OF DRAWING, Surveying, and Civil Engineering, at Tolleston, Lake county, Ind., 26 miles from Chicago, crossing of M. C. and P., Ft. W. and C. railroads. Opens April 15, until Sept. 15.
$30 to be a draftsman; $30 a surveyor; $60 a civil engineer. Drawing teachers sent to clubs of 10 to 20 scholars. Address A. VANDER NAILLEN, for circular. 6 3

SOMETHING NEW IN SCIENCE AND MEDICINE.—
Hadfield's Patent Portable Equalizers, for Curing Paralysis, Rheumatism, Neuralgia, Impotency, Nervous Debility, etc. With this invention the whole or any part of the body can be enclosed in an air-tight receiver, the air exhausted, which increases the circulation of blood and nervous fluid in any weak part, breaks up Congestions and Inflammations by equalizing the circulation. Send for a Circular to No. 48 W. 24th street, New York, or 277 Vine street, Cincinnati, Ohio. GEO. HADFIELD, M. D.
1*] Inventor and Patentee.

QUASSAICK MACHINE SHOP, Newburgh, N. Y.,
Manufactures
Iron and Wood-working Machinery,
Portable and Stationary Steam Engines, etc., etc.
Leonard & Clark Premium Lathes.
On hand—Two 16-inch, 8 ft. 6 inch. bed, price $650 each.
Five 18-inch, 15 ft. bed, price $850 each.
Wood's improved Molding and Planing Machines—will plane, tongue and groove 30 to 40 feet per minute—price $650.
New and staple machinery manufactured to order or by contract as required. 5 1

A NEW WORK ON
MODERN MARINE ENGINEERING,
Applied to Paddle and Screw Propulsion,
By N. P. BURGH, Engineer,

Author of "A Treatise on Sugar Machinery," "Practical Illustrations of Land and Marine Engines," "A Pocket-Book of Practical Rules for Designing Land and Marine Engines, Boilers, 'etc. "The Slide Valve Practically Considered, etc., etc.

SYNOPSIS OF THE CONTENTS:

Ordinary, Compound, and Expansive Engines, adapted for Paddle, Single and Twin Screw Propulsion.
Surface and Injection Condensers.
Expansion, Equilibrium, Slide, and other Valves.
Link Motion.
Starting Gear.
Thrust Blocks.
Paddle Wheels.
Screw Propellers.
Ordinary and Super-heating High and Low Boilers.

The plates are correctly tinted to portray the different materials, with the recognized colors adopted by Engineers for practical purposes.

The complete work comprises 300 pages of letter-press matter, illustrated by Thirty Highly Finished Colored Plates of Engines, etc., contributed by the most eminent firms in England and Scotland. Numerous clear woodcuts are interspersed in order to assist the student as well as to refresh the memory of the learned. All the examples depicted are those of the latest and best known design and construction.

Fifteen Parts, at $1 50 each Part.
D. VAN NOSTRAND, Publisher,
4 3] No. 192 Broadway, New York.

JUST READY.

A NEW GUIDE To the
SHEET IRON AND BOILER-PLATE ROLLER,
Containing a Series of Tables Showing the

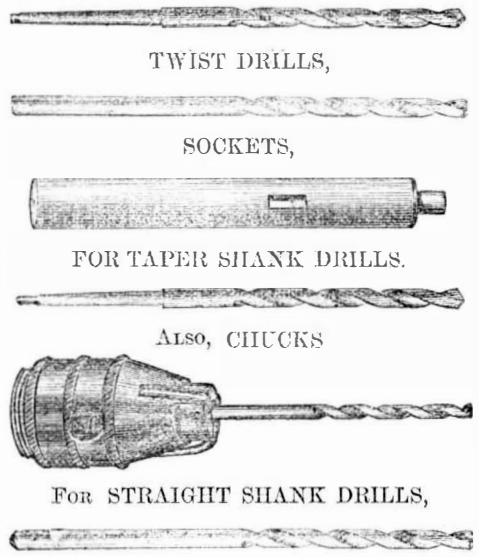
Weight of Slabs and Piles to Produce Boiler Plates, and of the Weight of Piles and the Sizes of Bars to Produce Sheet Iron; the Thickness of the Bar Gage in Decimals; the Weight per Foot, and the Thickness on the Bar or Wire Gauge of the Fractional Parts of an Inch; the Weight per Sheet, and the Thickness on the Gage of Sheet Iron of Various Dimensions to Weight 112 lbs. per Bundle; and the Conversion of Short Weight into Long, and of Long Weight into Short. Estimated and Collected by C. H. Perkins and J. G. Stowe. Published by Permission of the Perkins Sheet-Iron Company. Large oblong 8vo.....$2 50.

CONTENTS:

Weight of slabs to produce boiler plates (from 2 feet to 9½ feet, superficial measure, from ¼ inch to 1 inch in thickness, allowing for heating, rolling, and cropping).
Weight of slabs to produce boiler plates (from 10 feet to 18 feet, superficial measure, from ¼ inch to 1 inch in thickness, allowing for heating, rolling, and cropping).
Weight of piles to produce boiler plates (from 2 feet to 9½ feet, superficial measure, from ¼ inch to 1 inch in thickness, allowing for heating, rolling, and cropping).
Weight of piles to produce boiler plates (from 10 feet to 18 feet, superficial measure, from ¼ inch to 1 inch in thickness, allowing for heating, rolling, and cropping).
Weight of piles to produce sheet iron (from 2 feet to 9½ feet, superficial measure, from a wire gage to 14 wire gage allowing for heating, rolling, and cropping).
Weight of piles to produce sheet iron (from 10 feet to 18 feet, superficial measure, from 4 wire gage to 14 wire gage, allowing for heating, rolling and cropping).
Weight of piles to produce sheet iron (from 2 feet to 9½ feet, superficial measure, from 14 wire gage to 30 wire gage in thickness, allowing for heating, rolling and cropping, both bar and sheet).
Weight of piles to produce sheet iron (from 10 to 18 feet, superficial measure, from 14 wire gage to 30 wire gage in thickness, allowing for heating, rolling and cropping, both bar and sheet).
Sizes of bars to produce sheet iron (from 2 feet to 8 feet long, from 13 wire gage to 20 wire gage, allowing for heating, rolling and cropping).
Sizes of bars to produce sheet iron (from 2 feet to 8 feet long, from 21 wire gage to 30 wire gage, allowing for heating, rolling and cropping).
Table showing the thickness of the bar gage in decimals.
Table showing the weight per foot and the thickness on the bar or wire gage of the fractional parts of an inch.
Table showing the weight per foot, and the thickness on the wire gage of the fractional parts of an inch.
Table showing the weight per sheet, and the thickness on the wire gage of sheet iron 2 feet long by 1¼ feet wide, from 4 sheets to 70 sheets, to weigh 112 lbs. per bundle.
Table showing the weight per sheet, and the thickness on the wire gage of sheet iron 2½ feet long by 2 feet wide, from 2 sheets to 36 sheets, to weigh 112 lbs. per bundle.
Table showing the weight per sheet, and the thickness on the wire gage of sheet iron 4 feet long by 2 feet wide, from one sheet to 28 sheets, to weigh 112 lbs. per bundle.
Table showing the weight per sheet, and the thickness on the wire gage of sheet iron 4 feet long by 2½ feet wide, from 1 sheet to 23 sheets, to weigh 112 lbs. per bundle.
Table showing the weight per sheet, and the thickness on the wire gage of sheet iron 4 feet long by 3 feet wide, from 1 sheet to 19 sheets, to weigh 112 lbs. per bundle.
Table showing the weight per sheet, and the thickness on the wire gage of sheet iron 5 feet long by 2 feet wide, from 1 sheet to 23 sheets, to weigh 112 lbs. per bundle.
Table showing the weight per sheet, and the thickness on the wire gage of sheet iron 5 feet long by 2½ feet wide, from 1 sheet to 18 sheets, to weigh 112 lbs. per bundle.
Table showing the weight per sheet, and the thickness on the wire gage of sheet iron 5 feet long by 3 feet wide, from 1 sheet to 15 sheets, to weigh 112 lbs. per bundle.
Table showing the weight per sheet, and the thickness on the wire gage of sheet iron 6 feet long by 2 feet wide, from 1 sheet to 19 sheets, to weigh 112 lbs. per bundle.
Table showing the weight per sheet, and the thickness on the wire gage of sheet iron 6 feet long by 2½ feet wide, from 1 sheet to 15 sheets, to weigh 112 lbs. per bundle.
Table showing the weight per sheet, and the thickness on the wire gage of sheet iron 6 feet long by 3 feet wide, from 1 sheet to 12 sheets, to weigh 112 lbs. per bundle.
Short weight into long.
Long weight into short.

☞ The above, or any of my books, sent by mail free of postage, on receipt of price.

☞ My new Catalogue, complete to January 1, 1867, sent, postpaid, to any one who will favor me with his address. HENRY CAREY BAIRD,
4 3] Industrial Publisher, 406 Walnut st., Philadelphia.



MADE AND FOR SALE BY
MANHATTAN FIRE-ARMS COMPANY,
NEWARK, N. J.

PRICES:

Taper Shank Drills. Diam. of Drills.	Taper Shank Drills. Cash Price per Drill.	Straight Shank Drills. Diam. of Drills.	Straight Shank Drills. Cash Price per Drill.	Wire Drills. Nos. of Wire the Drills are made from.	Wire Drills. Cash Price per Drill.	Wire Drills. Cash Price per Dozen.
INCH.		INCH.				
8/8	$ 60	1/8	$ 14	1 to 5	20c	$2.15
13/32	65	5/32	16	6 to 10	19	2.05
7/16	70	3/16	18	11 to 15	18	1.95
15/32	75	7/32	20	16 to 20	17	1.85
1/2	80	1/4	25	21 to 25	16	1.75
17/32	85	9/32	30	26 to 30	15	1.60
9/16	90	5/16	35	31 to 35	14	1.45
19/32	1.00	11/32	40	36 to 40	13	1.30
5/8	1.10	3/8	50	41 to 45	12	1.20
21/32	1.20	13/32	55	46 to 50	11	1.10
11/16	1.30	7/16	60	51 to 60	10	1.10
23/32	1.45	15/32	65			
3/4	1.60	1/2	70			
25/32	1.75	17/32	75			
13/16	1.90	9/16	80			
27/32	2.05	19/32	90			
7/8	2.20	5/8	1.00			
29/32	2.35	21/32	1.10			
15/16	2.50	11/16	1.20			
31/32	2.65	23/32	1.35			
1	2.80	3/4	1.50			
1 1/32	2.95					
1 1/16	3.10					
1 3/32	3.25					
1 1/8	3.40					
1 5/32	3.55					
1 3/16	3.70					
1 7/32	3.85					
1 1/4	4.00					

Set of [69] Stubs' Wire Drills, from No. 60 to ¾ of an inch diameter, mounted on Stand, with No. marked on Stand to designate size of each Drill. . $10 00
The 11-32 and 3-8 Drills in the set of 69, have the shank turned to 5-16 diameter, that they may be used in the No. 2 Chuck.
Set of [60] Stubs' Wire Drills, from No. 1 to No. 60, mounted on Stand, with No. marked on Stand to designate size of each Drill. $8 00
Universal Chuck (No. 2), made entirely of steel, to accompany either of above sets of Wire Drills, (holding all sizes, from No. 0 to 5-16diameter.) $6 00
Set of 29 Taper Shank Drills, from ¾ of an inch to 1¼ inch diameter, varying by 32ds of an inch. $58 00
Set of 4 Steel Sockets, to accompany above set of 29 Drills. $6 00
$64 00
Set of 21 Taper Shank Drills, from ¾ of an inch to 1¼ inch diameter, varying by 32ds of an inch, above ¾ to ¾, and varying by 16th of an inch above ¾ to 1¼ . . . $36 00
Set of 4 Steel Sockets to accompany above set of 21 Drills. 6 00
$42 00
Set of 15 Taper Shank Drills, from ¾ of an inch to 1¼ inch diameter, varying by 16ths of an inch. $30 00
Set of 4 Steel Sockets to accompany above set of 15 Drills. 6 00
$36 00
Set of 21 Straight Shank Drills, from ⅛ of an inch to ¾-inch diameter, varying by 32ds of an inch. $13 00
Drills of extra length made to order.

Universal Chucks for holding Wire Drills, etc.

The No. 1 Chuck is particularly adapted for the work of Jewelers, Watchmakers, and other similar trades, requiring a very light and accurate tool. It carries all Wire Drills, from 0 to ⅛ of an inch diameter, weighs 2¼ ounces, is 1⅝ long, and ⅞ diameter. Price, $6 00.

The No. 2 Chuck carries all Wire Drills, from 0 to 5-16ths of an inch diameter. It also carries drills of 11-32nds and ¾ths diameter, having the shanks turned down to 5-16ths. Price, $6 00. Price of Solid Mandrel, 60c.

For the convenience of Screw makers and others, requiring Chucks capable of having the rods used in making screws to pass through the Chuck, we are making our No. 2 Chucks hollow, with hollow Mandrels accompanying them. The hollow space in the center of the Chuck and Mandrel will admit the passage of wires 5-16ths diameter down to 0.

The Chuck and Mandrel are each made entirely of steel. The Mandrel is 6 inches long and ⅞ of an inch in diameter. It is cylindrical in shape, and can be turned by the buyer to a taper, corresponding to the spindle of his lathe. A plug accompanies the hollow Mandrel, which is fitted to that end of the Mandrel which enters the body of the Chucks. By these arrangements, the Chuck can be used as if it had a solid center, or by removing the plug the Chuck and the spindle become hollow throughout their length. Price of Hollow Chuck $6 50. Price of Hollow Mandrel, $1 20.

These Chucks are made entirely of the best cast steel, and for accuracy of workmanship, durability, convenience, and cheapness, have no rival.

☞ Goods delivered in New York City free of charge.

FOR SALE AT ABOVE PRICES, BY
WILLIAM H. FRASSE, No. 62 Chatham street, New York.
NEWARK MANUFACTURERS' DEPOT, No. 85 Centre street, New York.
JOHN ASHCROFT, No. 50 John street, New York.
WILLIAM C. WELLS, No. 502 Commerce st., Philadelphia.
CHARLES H. SMITH, Philadelphia, Pa.
A. REUTER & SONS, Baltimore, Maryland.
WELLS, CHASE & GEHRMANN, Baltimore Maryland.
THOMAS HAWLEY & CO., Bridgeport, Connecticut.
ARMINGTON, GARDINER & DRAKE, Providence, R. I.
HORACE MCMURTRIE & CO., Boston, Mass.
CHARLES GOOCH, Cincinnati, Ohio.
T. & A. PICKERING, Cincinnati, Ohio.
GREENLEE, BROTHERS & CO., Chicago, Ill.
C. L. RICE & CO., Chicago, Ill.
OWENS, LANE, DYER & CO., St. Louis, Mo.

CAN I OBTAIN A PATENT?—For Ad- vice and instructions address MUNN & CO., 37 Park Row, New York for TWENTY YEARS Attorneys for American and Foreign Patents. Caveats and Patents quickly prepared. The Scientific American $3 a year 30,000 Patent cases have been prepared by M. & Co.

A MESSIEURS LES INVENTEURS— Avis important. Les inventeurs non familiers avec la langue Anglaise, et qui preferaient nous communiquer leurs inventions en Francais peuvent nous addresser dans leur langue natale. Envoyez nous un dessin et une description concise pour notre examen. Toute communications recived in confidence.
MUNN & CO.,
Scientific American Office, No. 37 Park Row, New York

© 1867 SCIENTIFIC AMERICAN, INC.

SHEET AND ROLL BRASS.

German Silver, Brass, and Copper Wire, etc. Especial attention to particular sizes and widths for Machinists and Type Founders.
Manufactured by the THOMAS MANUFACTURING COMPANY, Thomaston, Conn. 1 24*

JOSEPH HIRSH, PH. DR.

ANALYTICAL AND CONSULTING CHEMIST,
Manufacturer of
PURE CHEMICALS.
Office 33 Cortlandt street,
1 7*] New York.

THE BEST POWER HAMMER MADE

is the Dead Stroke Hammer of Shaw & Justice. Sizes suited for manufacturing awl blades or engine shafts; consume but little space, and require but little power. Manufactured by PHILIP S. JUSTICE,
14 North 5th street, Phila., and 42 Cliff-st., New York.
Shops 17th and Coates-sts., Philadelphia. 1 7*tf

SHAW & JUSTICE'S POWER HAMMER

is Moderate in Price, is driven with one-tenth the power used by other Hammers, and will not cost the one-hundredth part of what is usually spent in repairs. Its power is far in excess of any Hammer known. Manufactured by PHILIP S. JUSTICE,
14 North 5th street, Phila., and 42 Cliff-st., New York.
Shops 17th and Coates-sts., Philadelphia. 1 7* tf

NOTICE TO BRIDGE BUILDERS.

THE UNDERSIGNED, A COMMITTEE on the part of the Directors of the Harrisburg Bridge Company, hereby invite plans, specifications, and proposals to rebuild, during the ensuing season, the eastern portion of their bridge across the Susquehanna River, at at this point, it having been recently destroyed by fire.
The piers and abutments, as they stand, will be turned over to the contractors. The distance between the abutments is about 1,400 feet, and there are five stone piers standing intermediate, which, if upon examination prove sound, may be used in the new structure.
Plans and estimates are invited for either wooden bridge, wire suspension, or iron. Any plans submitted, unless adopted, will be returned to the owners if requested.
Any information as to dimensions or details as to old bridge may be obtained upon application to Mr. William Buehler, Treasurer of Harrisburg Bridge Company.
Plans and estimates should be enclosed in a sealed envelope and addressed to the Chairman of the Committee, on or before the 15th day of February, 1867.
HENRY McCORMICK,
JOHN H. BRIGGS,
H. G. MOSER,
5 3] Committee.

WOODWORTH PLANERS, BARLETT'S

Patent Power Mortise Machine, the best in market. Wood-working Machinery, all of the most approved styles and workmanship. No. 24 and 26 Central, corner Union street, Worcester, Mass.
4 9*] WITHERBY, RUGG & RICHARDSON.

WAUGH'S COMBINED SQUARE and

Circle Shears. All Tinners should have one. For Circulars address J. WAUGH, Elmira, N. Y. 5 3*

MASON'S PATENT FRICTION

CLUTCHES, for starting Machinery, especially Heavy Machinery, without sudden shock or jar, are manufactured by VOLNEY W. MASON,
1 tf*] Providence, R. I.

MODELS, PATTERNS, EXPERIMENTAL

and other Machinery, Models for the Patent Office, built to order by HOLSKE MACHINE CO., Nos. 528, 530, and 532 Water street, near Jefferson. Refer to SCIENTIFIC AMERICAN Office. 1 tf

WATER WHEELS.

WARREN'S AMERICAN TURBINE is acknowledged the best finished, the simplest constructed, and the greatest water-saving wheel in the market. Also, Warren's Improved Turbine Regulator is not surpassed for giving uniform speed. Address
ALONZO WARREN, Agent,
1 7*] 31 Exchange street, Boston, Mass.

R. BALL & CO.,

SCHOOL STREET, WORCESTER, MASS.,
Manufacturers of Woodworth's, Daniell's, and Gray & Wood's Planers, Sash Molding, Tenoning, Mortising, Upright and Vertical Shaping, Boring Machines, Scroll Saws, and a variety of other Machines and articles for working wood.
Send for our Illustrated Catalogue. 1 25*

COMPLETE SETS OF DRAWING IN-

struments, fine finish, from $2 25 per set to $150 per set, for sale by JAMES W. QUEEN & CO., 924 CHESTNUT STREET, Philadelphia, Pa. Catalogue and Manual of 112 pages, describing all mathematical instruments, their use, and how to use them and keep them in order, sent free. 1 6*

TAYLOR, BROTHERS & CO.'S BEST

YORKSHIRE IRON.—This Iron is of a Superior Quality or locomotive and gun parts, cotton and other machinery, and is capable of receiving the highest finish. A good assortment of bars in stock and for sale by JOHN B. TAFT, sole agent for the United States and Canadas. No. 18 Batterymarch-st., Boston. 1 40*—1t.

PATENT SHINGLE, STAVE, AND

Barrel Machinery, Comprising Shingle Mills, Heading Mills, Stave Cutters, Stave Jointers, Shingle and Heading Jointers, Heading Rounders and Planers, Equalizing and Cut-off Saws. Send for Illustrated List.
FULLER & FORD,
5 tf—C.] 282 and 284 Madison street, Chicago, Ill.

ANDREWS'S PATENT PUMPS, ENGINES, etc.—

CENTRIFUGAL PUMPS, from 90 Gals. to 40,000 Gals. per minute, capacity.
OSCILLATING ENGINES (Double and Single), from 2 to 250 horse-power.
TUBULAR BOILERS, from 2 to 50 horse-power, consume all smoke.
STEAM HOISTERS to raise from ½ to 6 tuns.
PORTABLE ENGINES, 2 to 20 horse-power.
These machines are all first-class, and are unsurpassed for compactness, simplicity, durability, and economy of working. For descriptive pamphlets and price list address the manufacturers, W. D. ANDREWS & BRO.,
1 tf No. 414 Water street N. Y

SPECIAL NOTICE.—THE "INTERNATIONAL PATENT AGENCY," in London, is removed to No. 8 Southampton Buildings, Chancery lane, which premises we have purchased for its permanent location. [34*] HASELTINE, LAKE & CO.

HARRISON STEAM BOILER.

NO MORE DESTRUCTION OF LIFE AND PROPERTY
BY
STEAM BOILER EXPLOSIONS.
GREAT REDUCTION IN PRICE.

From the rapid manner in which the
HARRISON STEAM BOILER
is coming into use, but little need be said of its conceded merits.
They may be summed up briefly as follows:—
Absolute safety from explosion, as it cannot be burst under any practicable steam pressure.
Less first cost.
Economy in fuel equal to the best in use.
Facility of transportation.
It occupies but about one third the ground area of ordinary boilers, with no increase in hight.

In consequence of recent improvements in its manufacture, this Boiler can be furnished to the public
AT LESS COST
than heretofore, and is now much the cheapest article in the market.
For Price and Circular apply to
JOSEPH HARRISON, JR.,
Harrison Boiler Works,
2 12] Gray's Ferry Road, Philadelphia.
Branch Office, 119 Broadway, New York, Rooms 9 and 10
J. B. HYDE, Agent.

IRON PLANERS, ENGINE LATHES,

Drills, and other Machinists' Tools, of Superior Quality, on hand and finishing. For Sale Low. For Description and Price, address NEW HAVEN MANUFACTURING CO., New Haven, Ct. 1 tf

OXY-HYDROGEN STEREOPTICONS,

OXY-CALCIUM STEREOPTICONS,
DISSOLVING LANTERNS,
MAGIC LANTERNS, Etc., Etc.
A Large Assortment of American, European, and Foreign Photograph Views for the same!! A Priced and Illustrated Catalogue, containing 15 Cuts and 56 pages, will be sent free by Mail on application.
WILLIAM V. McALLISTER,
1 24* 728 Chestnut street, Philadelphia.

1866.—TOPLIFF'S PATENT PER-

PETUAL LAMP WICK, received First Premium at N. Y. State Fair, and special premium, Book of Transactions. Needs no trimming. Rare inducements to Agents. Sample sent for 20 cents; two for 30 cents. MURPHY & COLE, 81 Newark ave., Jersey City. 3 tf 6

FIRST-CLASS MACHINISTS' TOOLS.

PRATT, WHITNEY & CO.,
Flower street, Hartford, Conn.,
Manufacturers of Engine Lathes, (15) fifteen inches to (8) eight ft. swing; Power Planers, (16) sixteen inches to (5) five feet wide, and of any length desired, and special machinery. Also only makers of Engine Lathes with Slate's Patent Taper Attachment, conceded by all who have used it to be most perfect and simple in its construction and almost indispensable for good workmanship.
For a circular and price list address as above. 3 26

IMPORTANT TO MANUFACTURERS

and Inventors.—SMITH & GARVIN, No. 3 Hague street, New York, Machinists and Model Makers, are now ready to make proposals for building all kinds of Light Machinery, Manufacturers' Tools, Models, etc. Satisfactory reference given. 1 13*

PATENTEES TAKE NOTICE.

Having made large additions to our works, we can add one or two machines to our list of manufactures. The machines must be strictly first class, and well protected. BLYMYER, DAY & CO., Manufacturers of Agricultural Machines and Tools Mansfield, Ohio. 3 tf

BULLARD & PARSONS, HARTFORD,

Conn., are prepared to furnish Shafting of any size and length, in large or small quantities. Our hangers are adjustable in every point, and fitted with Patent Self-oiling Boxes, guaranteed to run six months without re-oiling, and save 80 per cent of oil. By making a specialty of shafting, we are able to furnish very superior work at reasonable rates. Heavy work built to order. 1 tf

PORTABLE STEAM ENGINES, COM-

bining the maximum of efficiency, durability, and economy with the minimum of weight and price. They are widely and favorably known, more than 300 being in use. All warranted satisfactory or no sale. Descriptive circulars sent on application. Address
J. C. HOADLEY & Co., Lawrence, Mass. 1 tf

FREDERIC H. BETTS,

ATTORNEY AND COUNSELOR.
ADVOCATE IN PATENT AND COPYRIGHT CASES.
1 11*] 31 and 33 Pine street, New York City.

IMPORTANT TO IRONMASTERS.

PLAYER'S PATENT HEATING STOVES
for Blast Furnaces are recommended as the best and most efficient that have hitherto been used, inasmuch as blast can be heated 1200° Fah., without the least danger of injuring the cast-iron pipes through which the blast circulates. Already, 54 stoves have been erected, and 27 are in the course of erection. Apply to
JAMES HENDERSON,
1 6*] Agent, 218 Fulton st., N. Y.

WATER WHEELS.—

The Helical Jonval Turbine is manufactured by J. E. STEVENSON, 40 Dey street, New York. 3 5*

H. VAN DE WATER'S CELEBRATED

TURBINE WATER WHEEL.—This celebrated wheel has been thoroughly tested by the side of the best wheels—claimed to be—in the country, and with the same amount of water used, my wheel proved to be far superior; for the facts of which I respectfully refer you to my printed price list circular, which will be forwarded on application with stamp. Address
1 tf H. VAN DE WATER, Buffalo, N. Y.

AIR SPRING FORGE HAMMERS ARE

made by CHAS. MERRILL & SONS, 556 Grand street, New York. They will do more and better work, with less power and repairs, than any other Hammer. Send for a circular. 4 tf

ARTIFICIAL EARS For the Deaf—can be

Concealed. Send for a descriptive pamphlet to
5 4*] E. HASLAM, 32 John st., New York.

HASLAM'S RESPIRATORS, For Allevi-

ating the Breathing in Consumption, Asthma, etc. Invaluable to Travelers and persons following trades which are liable to irritate and injure the lungs. For descriptive circular send to E. HASLAM,
5 2*] Surgical Instrument Maker, 32 John st., N. Y.

ENGINEERING,

An Illustrated Weekly Journal,
Conducted by
ZERAH COLBURN, London.

This is the ablest Engineering paper published, and is edited by one of the best known scientific men of the day. It is finely and profusely illustrated and printed in the best manner, containing 32 pp. folio.
It is promptly received here by weekly steamers.
Subscriptions taken for a year or six months, commencing at any time. Price $10 per annum.

D. VAN NOSTRAND
Sole Agent for United States,
192 Broadway, New York.

☞ D. V. N. Publishes and Imports Scientific Books, and keeps a large assorted stock on hand, to which the attention of Engineers and Mechanical men is invited. Catalogues sent to any address on application. 4 3

PLATINUM VESSELS, STILLS, SHEET,

etc. H. M. RAYNOR, Office 748 Broadway, New York. Platinum Ore and Scrap purchased. 4 3*

ALCOTT'S CONCENTRIC LATHES.—

For Broom, Hoe, and Rake Handles, Chair Rounds, etc., and all other kinds of Wood-working Machinery, for sale by S. C. HILLS, 13 Platt street, New York. 2 tf b

MOLDING CUTTERS MADE TO OR-

DER.—Send for circular to WM. H. BROWN,
2 3* eow] 44 Exchange-st., cor. Union, Worcester, Mass.

CLOCKS FOR TOWERS, OFFICES, etc.,

also Glass Dials for illuminating. Address JOHN SHERRY, Oakland Works, Sag Harbor, N. Y. 2 3* eow

THE DRAWING-SCHOOL SET OF IN-

STRUMENTS.—Mahogany case, lined with velvet, containing pair Needle-point Dividers, with Pen, Pencil, and Extension bar; pair Plain Dividers; Spring Bow Pen, with needle-point; Protractor. Price $5. Ten per cent discount on five cases. Twenty per cent discount on ten cases. T. H. McALLISTER, Optician, 49 Nassau street New York (of late firm of McAllister and Bro., Phila.)
Illustrated Price List of Drawing and Surveying Instruments sent free to all applicants. 2 3* eow

CASTINGS.—THE UNDERSIGNED

are now prepared to do every variety of Brass and Composition Castings. HAYDEN, GERE & CO.,
3 12* 84 Beekman street.

FOR SALE—A VERY HEAVY SHAP-

ing Machine, or Compound Planer, but little used and in good order. BULLARD & PARSONS,
3 tf] Hartford, Conn.

HAYDEN, GERE & CO., 84 BEEKMAN

street, New York, manufacture every variety of Brass Work for steam, water and gas.
Globe Valves, Steam, Gage and Air Cocks, Whistles, Oil Cups, Water Gages, Plain Bibbs, Stops, Hose Pipes, Couplings, etc.
Address as above for price lists. Illustrated catalogue furnished to customers. 3 12*

PARIS EXHIBITION, 1867.

GUSTAVUS HUNDT,
Rue du Mail 18, Paris,
Commission Merchant and General Agency.
SPECIALTY:—All the Latest Improved Machines used in the manufacture of woolens. Offers his services to exhibitors, purchasers, sellers, and visitors generally. Correspondence in English, French, and German. Address as above, or to Henry Kayser, Esq., New York, or J. O. Hundt, 46 Dey street (up stairs), New York. 4 8

GODDARD'S BURRING MACHINE

WORKS, Second avenue, cor. Twenty-second street.
Office, No. 3 Bowling Green, New York,
Manufacture the Patent Mestizo Wool
BURRING PICKERS,
for opening, picking, dusting and burring Mestizo and all other medium to fine foreign and domestic wools, and cleaning waste.
Patent Worsted Wool Burring Pickers, for opening, picking, dusting and burring Worsted, Carpet, Delaine, and other coarse foreign and domestic wools.
Oilers to attach to pickers, for oiling or watering, in the form of spray, the wool issuing therefrom.
The only Patent Steel Ring BURRING MACHINES, single and double, for first breakers of wool-carding machines; Fine Steel Ring Burring Machines, for second breakers and finishers of wool cards; Steel Ring Feed Rolls, with patent adjustable spring boxes; Shake Willows, with blowers for opening and dusting wool and waste and mixing wools; Wool and Waste Dusters, without blowers; Kayser's Patent Gessner Gigs.
Prompt attention given to all inquiries and orders addressed to C. L. GODDARD,
3 tf No. 3 Bowling Green, N. Y.

NITRO-GLYCERIN.—

UNITED STATES BLASTING OIL CO.—We are now prepared to fill all orders for Nitro-Glycerin, and respectfully invite the attention of Contractors, Miners and Quarrymen to the immense economy in the use of the same. Address orders to
JAMES DEVEAU, Sec.,
2 52] 32 Pine street, New York

TRANSLATIONS FROM THE FRENCH

and German languages into English, and the English into French and German, conducted with dispatch and upon moderate terms, by R. V. BRIESEN. Address Box 773 New York Post-office. [4 6—G

MANUFACTURERS' AGENCY, For In-

troducing and establishing the sale of new and meritorious articles. Address J. C. FELLOWS,
5 6*] 16 Dey street, New York.

RICHARDSON, MERIAM & CO.,

Manufacturers and Dealers in
DANIELS'S AND WOODWORTH PLANERS,
Boring, Matching, Molding, Mortising and Tenoning Machines, Scroll, Cut-off, and Slitting Saws, Saw Mills, Saw Arbors, Spoke and Wood-turning Lathes, and other wood-working Machinery. Warehouse, 107 Liberty street, New York. Manufactory, Worcester, Mass. 2 tf

ERICSSON CALORIC ENGINES OF

GREATLY IMPROVED CONSTRUCTION.—Ten years of practical working by the thousands of these engines in use, have demonstrated beyond cavil their superiority where less than ten horse-power is required. Portable and Stationary Steam Engines, Grist and Saw Mills, Cotton Gins' Air Pumps, Shafting, Pulleys, Gearing Pumps, and General Jobbing. Orders promptly filled for any kind of Machinery. JAMES A. ROBINSON,
1 tf—D] 164 Duane street, cor. Hudson, New York.

IMPORTANT.

MOST VALUABLE MACHINE for all kinds of irregular and straight work in wood, called the Variety Molding and Planing Machine, indispensable to competition in all branches of wood-working. Our improved guards make it safe to operate. Combination collars for cutters, saving 100 per cent, and feed table and connection, for waved moldings and planing, place it above all others. Evidence of the superiority of these machines is the large numbers we sell, in the different states, and parties laying aside others and purchasing ours, for cutting and shaping irregular forms, sash work, etc.
We hear there are manufacturers infringing on some one or more of our nine patents in this machine. We caution the public from purchasing such.
All communications must be addressed "Combination Molding and Planing Machine Company, cor. 1st ave. and 24th-st., New York, where all our machines are manufactured, tested before delivery, and warranted.
Send for descriptive pamphlet. Agents solicited. [1 13*tf

E. R. GARD'S

PATENT BRICK MACHINE,

BEST IN USE,
TOOK EIGHT STATE-FAIR PREMIUMS.
FIFTY HANDS CONTINUALLY BUILDING THEM.
Office and Manufactory,
53 SOUTH JEFFERSON STREET,
CHICAGO, ILL.
For Descriptive Circular address
E. R. GARD,
53 South Jefferson street, Chicago, Ill.

WINANS'S ANTI-INCRUSTATION

Powder, New York—Costs about ten cents daily to prevent scale. Never foams, stops leaks, saves fuel, repairs and expense of cleaning. 5 3*

OILERS—Olmsted's Improved Spring Top

The spring cannot be set or injured by pressing upon it to expel the oil. Warranted the most substantial oiler in the market. Price for No. 1, Machinist's size, $3 60 per dozen. The trade generally is supplied. Send for Circular. Address L. H. OLMSTED, Stamford, Conn. 1 tf

GOULD MACHINE COMPANY,

Of Newark, N. J., and 102 Liberty street, New York.
IRON AND WOOD-WORKING MACHINERY,
STEAM ENGINES, BOILERS, SAW MILLS, ETC. 1 tf

THE CELEBRATED "SCHENCK"

WOODWORTH PLANERS,
WITH NEW AND IMPORTANT IMPROVEMENTS,
Manufactured by the
SCHENCK MACHINE CO., MATTEAWAN, N. Y.
JOHN B. SCHENCK, President.
T. J. B. SCHENCK, Treas. 1 10

LYONS PEAT MACHINE.—OWNERS

of peat land, and others interested in the manufacture of peat fuel, are invited to examine the working of this automatic machine, at the works of L. E. OSBORN & Co., 16 and 18 Artisan street, New Haven, Conn. For further particulars address them, or LYONS PEAT MACHINE CO., Litchfield, Conn. 4 4*

CHARLES A. SEELY, CONSULTING

and Analytical Chemist, No. 26 Pine street, New York. Assays and Analyses of all kinds. Advice, Instruction, Reports, etc., on the useful arts. 1 tf

SPICE AND BLACKING-BOX MAK-

ERS will find it to their interest to use Painter's Patent Method of Fastening without Solder, a neat and secure joint being expeditiously made from the tin at a fraction of the cost of soldering. Thirty machines in use by leading manufacturers. Full particulars, references, and samples furnished by the proprietors,
WM. PAINTER & CO.,
5 4] 45 Holliday street, Baltimore, Md.

NITRO-GLYCERIN.—

Parties requiring the above article in quantity—say 100 lbs. per day—are invited to correspond with the subscriber, who has devised a new method for its manufacture, reducing the cost as well as the risk to a minimum.
GEO. M. MOWBRAY,
1 10] Titusville, Pa.

VAN DE WATER CELEBRATED WA-

TER WHEEL.—For Sale at the Eagle Iron Works, Buffalo, N. Y. [5 11*] DUNBAR & HOWELL.

LATHE CHUCKS—HORTON'S PAT-

ENT—from 4 to 24 inches. Manufacturer's address, E. HORTON & SON, Windsor Locks, Conn. 5 25*.

WANTED—IN THE DIFFERENT

States, stationary and traveling agents, who are engaged in selling machinery, to sell for a company now manufacturing a machine which will be used in all the different departments of wood-working manufacture, and now rapidly selling. For particulars address J. Q. SLOAN, Post-office Box 3,901, New York. 5 4—T.

BUERK'S WATCHMAN'S TIME DE-

TECTOR.—Important for all large Corporations and Manufacturing concerns—capable of controlling with the utmost accuracy the motion of a watchman or patrolman, as the same reaches different stations of his beat. Send for a Circular. J. E. BUERK,
P. O. Box 1,057, Boston, Mass.
N. B.—This detector is covered by two U. S. patents. Parties using or selling these instruments without authority from me will be dealt with according to law. 1 7*

GROVER & BAKER'S HIGHEST PRE-

MIUM ELASTIC Stitch Sewing Machines, 495 Broadway, N. Y. 1 tf

$200 A MONTH IS BEING MADE

with our IMPROVED STENCIL DIES, by Ladies and Gentlemen. Send for our free Catalogue containing Samples and Prices. Address
S. M. SPENCER & CO.,
1 tf—R.] Brattleboro, Vt.

THOMAS BARRACLOUGH & CO.,

MANCHESTER, ENGLAND,
Makers and Patentees of
HECKLING, SPINNING, LAYING,
And other Machines, for the Manufacture of
ROPE LINES, CORD, TWINE, FISHING LINES,
1 11*] SPUN YARN, NETS, ETC.

WOOD & MANN STEAM ENGINE

CO.'S CELEBRATED PORTABLE AND STATIONARY STEAM ENGINES AND BOILERS, from 4 to 35 horse-power. Also, PORTABLE SAW MILLS.
We have the oldest, largest, and most complete works in the United States, devoted exclusively to the manufacture of Portable Engines and Saw Mills, which, for simplicity, compactness, power, and economy of fuel, are conceded by experts to be superior to any ever offered to the public.
The great amount of boiler room, fire surface, and cylinder area, which we give to the rated horse-power, make our Engines the most powerful and cheapest in use; and they are adapted to every purpose where power is required.
All sizes constantly on hand, or furnished on short notice. Descriptive circulars, with price list, sent on application. WOOD & MANN STEAM ENGINE CO.
Utica, N. Y. Branch office 96 Maiden Lane N. Y. City.
1 32*

FOR ENGINE BUILDERS' AND STEAM

Fitters' Brass Work, address
F. LUNKENHEIMER,
1 7*] Cincinnati Brass Works.

WHEELER & WILSON, 625 BROAD-

way, N. Y.—Lock-stitch Sewing Machine and Buttonhole do. 1t

STATIONARY ENGINES

Built under the
BABCOCK & WILCOX
PATENTS.
An entirely novel arrangement of valve gear, guaranteed to give a more regular speed, and to consume less fuel per horse-power than any engine in use. Call or send for a circular.
HOWARD ROGERS,
1 20*] 50 Vesey street. New York.

PAPER-MILL MACHINERY.

Megaw's Improved Rotary Pump for paper mills steam engines and boilers, manufactured by
5 4*] MEGAW & BILLANY, Wilmington, Del.

FOR SALE—ONE SECOND-HAND UP

right Hydraulic Press, with pumps in good order
5 4*] F. W. KRAUSE, Chicago, Ill.

PATENT POWER AND FOOT-PUNCH-

ING PRESSES, the best in market, manufactured by N. C. STILES & CO., West Meriden, Conn. Cutting and Stamping Dies made to order. Send for Circulars. [1 13* tf

MICROSCOPES, MICROSCOPIC OB-

jects, Spy-Glasses, Opera-Glasses, Marine and Field-Glasses, Stereoscopes, and Views; and Lenses of all sizes and foci. Made and for sale by
JAMES W. QUEEN & CO.,
924 Chestnut street, Philadelphia, Penn.
Priced and Illustrated Catalogue sent free. 1 12*

WOOD, LIGHT & CO.—MANUFAC-

turers of Machinists' Tools and Naysmyth Hammers, Lathes from 4 to 30 feet long, and from 15 to 100 inches swing. Planers from 24 to 60 inches wide and from 4 to 46 feet long. Upright Drills. Milling and Index Milling Machines. Profile or Edging Machines. Gun Barrel Machines Shafting, Mill Gearing, Pulleys and Hangers, with Patent Self-oiling Boxes.
Works, Junction Shop, Worcester, Mass.
Warehouse at 107 Liberty street, New York. 2 tf

PRESSURE BLOWERS.

PRESSURE BLOWERS—FOR CUPOLA Furnaces, Forges, and all kinds of Iron Works. The blast from this blower is four times as strong as that of ordinary fan blowers, and fully equal in strength to piston blowers, when applied to furnaces for melting iron. They make no noise and possess very great durability, and are made to run more economically than any other blowing machine. Every blower warranted to give entire satisfaction. Ten sizes, the largest being sufficient to melt sixteen tuns of pig iron in two hours. Price varying from $40 to $345.
FAN BLOWERS, from No. 1 to No. 45 for Steamships, Iron Mills, Ventilation, etc., manufactured by
B. F. STURTEVANT,
1 tf] No. 72 Sudbury street, Boston, Mass.

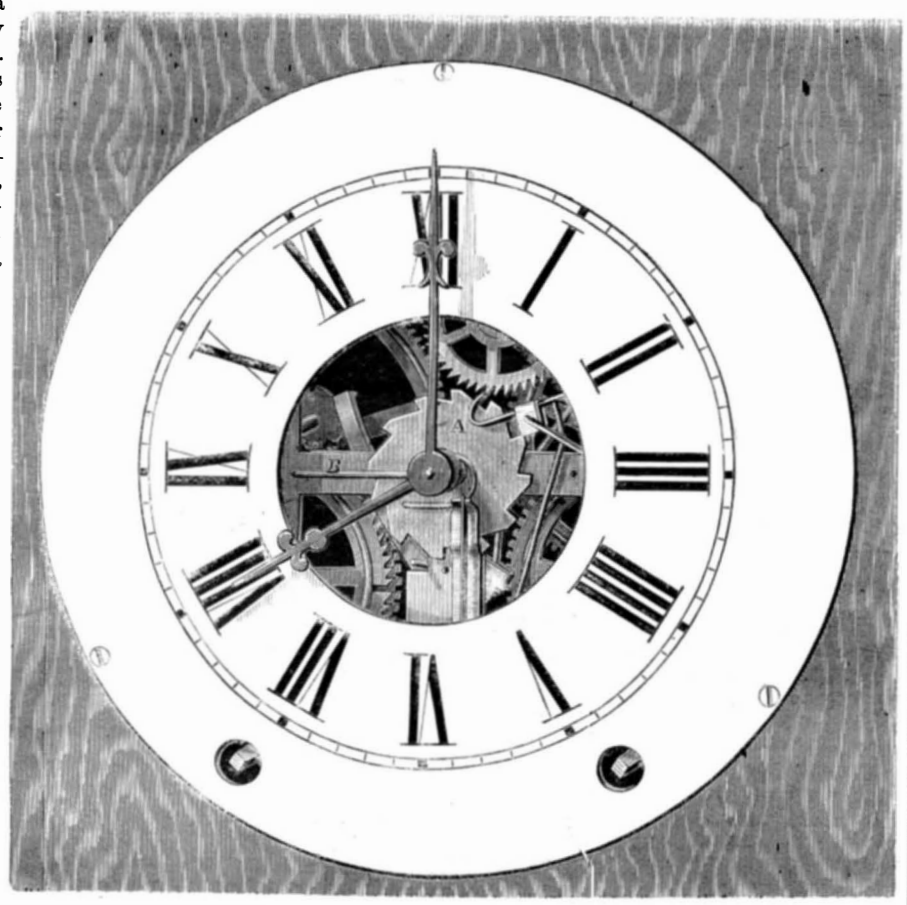
OIL! OIL!! OIL!!!

For Railroads, Steamers, and for machinery and Burning, PEASE'S Improved Engine Signal, and Car Oils, indorsed and recommended by the highest authority in the United States and Europe. This Oil possesses qualities vitally essential for lubricating and burning, and found in no other oil. It is offered to the public upon the most reliable, thorough, and practical test. Our most skillful engineers and machinists pronounce it superior to and cheaper than any other, and the only oil that is in all cases reliable and will not gum. The "Scientific American", after several tests, pronounces it "superior to any other they have used for machinery." For sale only by the Inventor and Manufacturer, F. S. PEASE, No 61 and 63 Main street, Buffalo N. Y.
N. B.—Reliable orders filled for and part of the world.
1 tf

© 1867 SCIENTIFIC AMERICAN, INC.

Improved Differential Movement.

The three engravings herewith presented show different views of a device for taking the place of the cannon wheel, lifting wire, and connections, which constitute the differential movement. Fig. 1 is a clock face showing a front view of the attachment; Fig. 2 a face view of a temporary model, and Fig. 3 a reverse view of the same. The hour hand is rigidly secured to the ratchet wheel, A, which turns on the spindle that carries the minute hand. This wheel is held against the face plate by a spring, B. The minute hand is attached to the spindle by a sleeve in a manner similar to the ordinary way of attaching the hour hand. The minute hour spindle has attached at the rear of the face plate two cams, C, the outer one of which gives a reciprocating movement to a long lever, D, and carries a shorter one—jaw seen at E—which is pivoted at F, and has a projecting pin, G, that engages with the teeth of the wheel, A.



HOLDEN'S DIFFERENTIAL MOVEMENT.

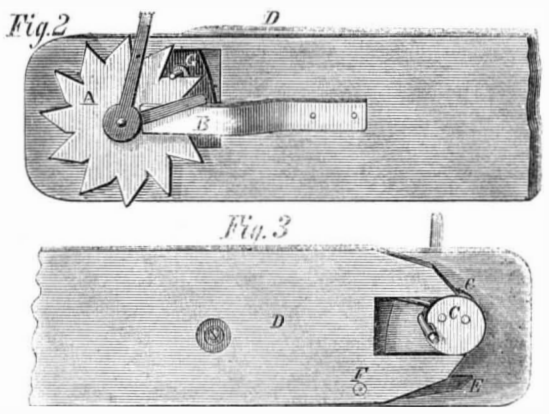
The operation is as follows: When the clock is to be set to the hour the minute hand is turned two-thirds or five-sixths of a revolution as the cams may be set. The pin, G, by the movement to the lever, E, is carried out of the wheel teeth and transversely across and up sufficiently to again engage a tooth before the hour hand receives any motion. The wheel is then turned by the pin one tooth or one-twelfth of a revolution. From this brief description watch and clock makers may understand the device and its objects. The inventor claims it is cheaper than the common differential movement in a clock, that there would be no pin and washer to be lost, that applied to a watch the face could be made permanently fast and the wheels would not get changed by watch tinkerers. It is the subject of a patent obtained March 13, 1866, by Hoban J. Holden, of Genoa, N. Y. He will furnish any additional explanations.

DEVICES FOR ELEVATING LIQUIDS.

Should the question be propounded to any one haphazard; "what machine is most generally used?" he might reply, the sewing machine. But although the number of these useful machines which have been manufactured and sold within the past fifteen years is almost incalculable, and they are in common use, we are disposed to award the palm to the pump.

Just glance at the variety of form, the numberless adaptations of one single principle, to say nothing of the designs which are the product of the fancy, and we find among the list, pumps with one bucket and those with two in the same chamber; pumps with and without valves; those with valves of leather, brass, wood, lead, glass, india-rubber, canvas, and combinations of several of these; pumps in which the bucket is the valve; those with flexible barrels or cylinders and others with them of rigid material; those the barrel of which works on a fixed piston, and others having a compressible air chamber for ejecting the water. Every manufacturer seemed to suppose his pump could be of little value unless it was as different from all others as it was possible to make it; still the same principle is at the bottom of all of whatever style and operation; that of atmospheric pressure, vulgarly called suction.

As pumps are the most generally used of machines, so they are the most generally abused. The common household pump is used to pump turgid and sandy water, which rapidly cuts away the valves, of whatever material made. It is left with water in the barrel and the valves allowed to freeze. It is exposed to the action of the salts held in solution in spring water, and is operated by the mechanically inclined, by adults, children, and by anybody. It is evident, then, that the simpler the pump, the fewer its parts, the stronger its build, the better it is fitted for its work. That pump which fulfils these conditions and can be repaired by any person of ordinary ability, being made of material not likely to injuriously affect the water for domestic purposes is the best common pump for ordinary uses. The object, then, of the improvers of the pump who are continually claiming to perfect this implement should be to make it so simple and durable that getting out of order shall be nearly impossible unless from legitimate wear. Such a pump would, to be sure, largely diminish the amount of work now expended in repairs, but as these repairs are not the special business of any workshop but are generally done by home tinkerers, this loss would not be felt except as diminishing vexation and annoyance.



Advertisements.

A limited number of advertisements will be admitted in this page on the following terms:—Seventy-five cents a line, each insertion, for solid matter; one dollar a line when accompanied by engravings.

HOW TO OBTAIN PATENTS.

The first inquiry that presents itself to one who has made any improvement or discovery is: "Can I obtain a Patent?" A *positive* answer can only be had by presenting a complete application for a Patent to the Commissioner of Patents. An application consists of a Model, Drawings, Petition, Oath, and full Specification. Various official rules and formalities must also be observed. The efforts of the inventor to do all this business himself are generally without success. After a season of great perplexity and delay, he is usually glad to seek the aid of persons experienced in patent business, and have all the work done over again. The best plan is to solicit proper advice at the beginning.

If the parties consulted are honorable men, the inventor may safely confide his ideas to them: they will advise whether the improvement is probably patentable, and will give him all the directions needful to protect his rights.

We (MUNN & CO.) have been actively engaged in the business of obtaining patents for over twenty years—*nearly a quarter of a century.* Many thousands of inventors have had benefit from our counsels. More than one-third of all patents granted are obtained by us.

Those who have made inventions and desire to consult with us, are cordially invited to do so. We shall be happy to see them in person, at our office, or to advise them by letter. In all cases they may expect from us an *honest opinion.* For such consultations, opinion, and advice, *we make no charge.* A pen-and-ink sketch, and a description of the invention should be sent, together with stamps for return postage. Write plainly do not use pencil nor pale ink; be brief.

All business committed to our care, and all consultations, are kept by us *secret and strictly confidential.* Address MUNN & CO., 37 Park Row, New York.

In Order to Apply for a Patent, the law requires that a model shall be furnished, not over a foot in any dimensions,—smaller, if possible. Send the model by express, pre-paid, addressed to Munn & Co., 37 Park Row, N. Y., together with a description of its operation and merits; also, remit the first Government and stamp fees, $16. On receipt thereof we will prepare the patent papers and send them to the inventor for examination, signature, and oath. Our charge for preparing the drawings and all the documents, with attendance to the business before the Patent Office, is $25, for the simplest cases, up to $35, and more, according to the labor involved. Our charges are always very moderate. When the patent is allowed, $20 more is paid the Government, making a total of $61 for the simplest case.

The model should be neatly made of any suitable materials, strongly fastened, without glue, varnished or painted. The name of the inventor should be engraved or painted upon it. When the invention consists of an improvement upon some other machine, a full working model of the whole machine will not be necessary. But the model must be sufficiently perfect to show, with clearness, the nature and operation of the improvement.

New medicines or medical compounds, and useful mixtures of all kinds, are patentable.

When the invention consists of a medicine or compound, or a new article of manufacture, or a new composition, samples of the article must be furnished, neatly put up. Also, send us a full statement of the ingredients, proportions, mode of preparation, uses, and merits.

The average time required to procure a patent is six weeks. We frequently get them through in less time; but in other cases, owing to delay on the part of the officials, the period is sometimes extended to two or three months, and even more. We make a special point to forward our cases as RAPIDLY AS POSSIBLE.

Quick Applications.—When, from any reason, parties are desirous of applying for Patents or Caveats, in GREAT HASTE, without a moment's loss of time, they have only to write or telegraph us specially to that effect, and we will make special exertions for them. We can prepare and mail the necessary papers at less than an hour's notice, if required.

Caveats.—A Caveat gives a limited but immediate protection, and is particularly useful where the invention is not fully completed, or the model is not ready, or further time is wanted for experiment or study. After a Caveat has been filed, the Patent Office will not issue a patent for the same invention to any other person, without giving notice to the Caveator, who is then allowed three months time to file in an application for a patent. A Caveat, to be of any value, should contain a clear and concise description of the invention, so far as it has been completed, illustrated by drawings when the subject admits. A Caveat consists of the Petition, Oath, Specification, and Drawings. The Government fee for filing a Caveat is $10, and our ordinary charge to prepare the documents and attend to the whole business from $10 to $15. In order to file a Caveat the inventor needs only to send us a letter containing a sketch of the invention, with a description in his own words, and fees, $25 in full. Address MUNN & CO., 37 Park Row, N. Y.

Additions can be made to Caveats at any time. A Caveat runs one year, and can be renewed on payment of $10 a year for as long a period as desired.

Preliminary Examination.—This consists of a *special search*, made at the U. S. Patent Office, Washington through the medium of our house in that city, to ascertain whether, among all the thousands of patents and models there stored, any invention can be found which is similar in character to that of the applicant. On the completion of this special search, we send a *written report* of the result to the party concerned, with suitable advice. Our charge for this service is $5.

If the device has been patented, the time and expense of constructing models, preparing documents, etc., will, in most cases, be saved by means of this search: if the invention has been in part patented, the applicant will be enabled to modify his claims and expectations accordingly.

Parties desiring the Preliminary Examination are requested to remit the fee ($5), and furnish us with a sketch or photograph, and a brief description of the invention.

Where examination is wanted upon more than one invention, $5 for each must be sent, as each device requires a separate, careful search. Address MUNN & CO., 37 Park Row, New York.

Infringements.—The general rule of law is, that the prior patentee is entitled to a broad interpretation of his claims. The scope of any patent is therefore governed by the inventions of prior date. To determine whether the use of a patent is an infringement of another, generally requires a most careful study of all analogous prior patents and rejected applications. An opinion based upon such study requires for its preparation much time and labor.

Having access to all the patents, models, public records, drawings, and other documents pertaining to the Patent Office, we are prepared to make examinations, and give opinions upon all infringement questions, advice as to the scope and ground covered by patents, and direct with vigor any legal proceedings therewith connected. Address MUNN & CO., 37 Park Row, N. Y.

The expense of these examinations, with written opinion, varies from $25 to $100 or more, according to the labor involved.

When an application is found to conflict with a caveat, the caveator is allowed a period of three months within which to present an application, when an interference may be declared.

Upon the declaration of an interference, a day will be fixed for closing the testimony and a further day fixed for the hearing of the cause. The arguments of counsel must be in the office on the day of hearing.

If either party wishes a postponement, either of the day for closing the testimony, or of the day of hearing, he must, before the day he thus seeks to postpone is past, show by affidavit, a sufficient reason for such postponement.

The management of Interferences is one of the most important duties in connection with Patent-Office business. Our terms for attention to Interferences are moderate, and dependent upon the time required. Address all letters to MUNN & CO., No. 37 Park Row, New York.

Our Book of Instructions, containing the Patent Laws, Official Rules, 150 engravings, valuable tables for calculations, and full instructions concerning the cost of patents, method of proceedure, forms for assignments, etc., is *sent gratis* on application.

Address all letters (post-paid),

MUNN & CO.,
No. 37 Park Row, New York City.

Office in Washington, Cor. F and 7th streets.

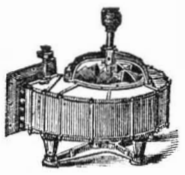
☞ The SCIENTIFIC AMERICAN, a large and splendid weekly newspaper, profusely illustrated, devoted to Inventions, Science, and the various Arts, is published by MUNN & CO. at $3 a year. Specimens gratis.

PATTERN LETTERS and FIGURES for foundrymen, machinists, pattern makers, inventors, etc., to letter patterns to cast from.
6 3] KNIGHT BROS., Seneca Falls, N. Y.

TINNERS' MACHINES AND DRILL Stocks. Far the best in the world. Address
6 8*] A. W. WHITNEY, Woodstock, Vermont.

LE VAN'S IMPROVED GOVERNOR, with BALANCE VALVE. The simplicity of design and ease of construction, and small amount of material employed, allows this Governor to be offered at a lower price than any good Regulator now made.
Circular and Photographs sent on application, and entire satisfaction guaranteed in all cases.
W. BARNET LE VAN,
6 1* os] 24th and Wood streets, Philadelphia.

TURBINE WATER WHEELS.



The REYNOLDS PATENT embodies the progressive spirit of the age. Simplicity, Economy, Durability, Accessibility all combined. The only Turbine that excels Overshots. Awarded the Gold Medal by American Institute.
Shafting, Gearing and Pulleys furnished for all kinds of Mills, made on Mechanical Principles, under my personal supervision, having had long experience. Circulars sent free.
GEORGE TALLCOT,
4 os 13* tf—H] No. 96 LIBERTY STREET, NEW YORK.

$30,000 FOR A FORTUNE, AND NO DECEPTION.
Address HARRIS BROTHERS, Boston, Mass. 3 4os*

FOR SALE.—WILL SELL THE exclusive right to manufacture and sell my improved Wire Clothes Line and Fastener attached. Allowed 4th inst. Address ALBERT D. RUST, Patentee,
5 2 os*] St. Louis, Gratiot Co., Mich.

EUROPEAN AGENCY
for the
EXHIBITION AND SALE OF
AMERICAN PATENTS AND MANUFACTURES.
BLANCHARD & McKEAN
Will attend personally and promptly to all business relating to the interests of American Inventors and Manufacturers in France and England.
For Circular and further information address
82 Boulevard de Sebastopol,
Paris, France.
Or, Post-office box 365, Washington, D. C. 3 4os*

Zur Beachtung für Deutsche Erfinder.

Nach dem neuen Patent-Gesetze der Vereinigten Staaten, können Deutsche, sowie Bürger aller Länder mit einer einzigen Ausnahme, Patente zu denselben Bedingungen erlangen, wie Bürger der Ver. Staaten. —

Erkundigungen über die, zur Erlangung von Patenten nöthigen Schritte, können in deutscher Sprache schriftlich an uns gerichtet werden und Erfinder welche persönlich nach unserer Office kommen, werden von Deutschen prompt bedient werden.
Man adressire
Munn & Co.,
37 Park Row, New York.

ASTRONOMICAL TELESCOPE FOR Sale.—A Fine Instrument, made by Alvan Clark & Sons, Cambridge; object glass 4¼ in., focus 6 ft. 3 in., with Micrometer, Positive and Negative Eye Pieces, Alt-azimuth Stand, all complete. A fine opportunity for a college or an amateur. Address Telescope, box 599 P. O., N.Y. 5 os2*

THE EUROPEAN INVENTOR'S AGENCY CO., 96, Newgate street, London, E. C.
MR. T. BROWN, C. E., Manager.
This Company undertake the purchase, sale, or licensing of Patents in any part of the World, on Commission only.
No business as Agents for procuring Letters Patent undertaken.
Information for Inventors or Owners of Patents, or for those desirous of purchasing Patents, will be freely given.
The Offices of the Company are at the disposal of Inventors and these interested in Inventions; also, for the convenience of those having no London address their letters can be addressed to the offices.
Further particulars on application.

SETS, VOLUMES AND NUMBERS. Entire sets, volumes and numbers of SCIENTIFIC AMERICAN (Old and New Series) can be supplied by addressing A. B. C., Box No. 773, care of MUNN & CO., New York.

Scientific American.
ENLARGED FOR 1867.

This is the oldest, the largest and most widely circulated journal of its class now published. It is the constant aim of the Editors to discuss all subjects relating to the industrial arts and sciences, in a plain, practical, and attractive manner.

All the latest and best Inventions of the day are described and illustrated by SPLENDID ENGRAVINGS prepared expressly for its columns by the first Mechanical Engravers in the country.

It would be impossible within the limits of this Prospectus, to enumerate the great variety of subjects discussed and illustrated. A few only can be indicated, such as Steam and Mechanical Engineering, Fire-arms, Mechanics' Tools, Manufacturing Machines, Farm Implements, Hydraulic Engines, Wood-working Machines, Chemical Apparatus, Household Utensils, Curious Inventions, beside all the varied articles designed to lighten the labors of man in the Shop, Factory, Warehouse, and Household.

The SCIENTIFIC AMERICAN has always been the Advocate of the Rights of American Inventors. Each number contains a weekly list of Claims of Patents, furnished expressly for it by the Patent Office, together with notes descriptive of American and European Patented Inventions.

Patent Law Decisions, and questions arising under these laws, are fully and freely discussed by an able writer on Patent Law.

Correspondents frequently write that a single recipe will repay them the whole cost of a year's subscription.

With such advantages and facilities, the columns of the SCIENTIFIC AMERICAN are of special value to all who desire to be well informed about the progress of Art, Science Invention, and Discovery.

Published Weekly, two volumes each year, commencing January and July,

Per annum.....$3 00
Six months.....1 50
Ten copies for One Year.....25 00

Canada subscriptions, 25 cents extra. Specimen copies sent free. Address

MUNN & CO., Publishers,
No. 37 Park Row, New York City

© 1867 SCIENTIFIC AMERICAN, INC.